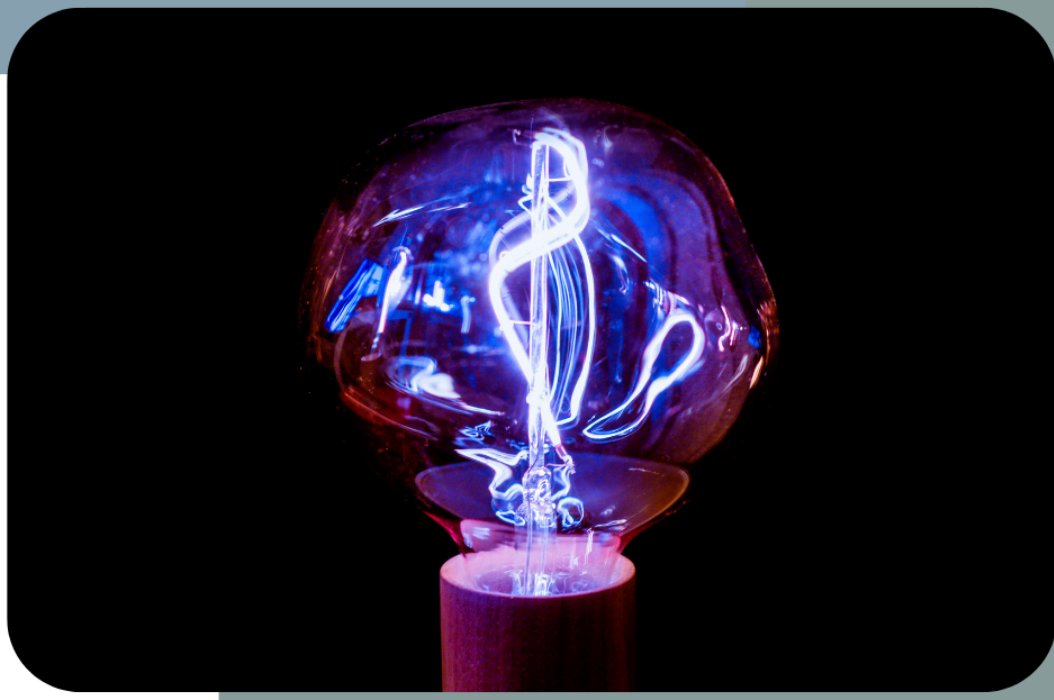
IVQ2023

DECEMBER 2023

ITALIAN MARKET SCENARIO UPDATE



REF4E SCENARI

MBS
A Cerved Company

1 Frame of Reference

REF-E scenarios over the time horizon 2024-2050 (with projections up to 2060) are elaborated by MBS Consulting experts on the base of proprietary suites and market knowledge. Econometric and structural models, as well as our expert sensitiveness, detailed knowledge of regulation, and accurate monitoring of market outcomes underlie our elaborations.

Gas and electricity forecasts consider the diverse geopolitical and economic hypothesis deriving from the regulatory, financial and fundamentals adjustments to the disruption generated both from the pandemic and the Ukrainian war, which are seen as key determinants of the future equilibrium of the energy markets.

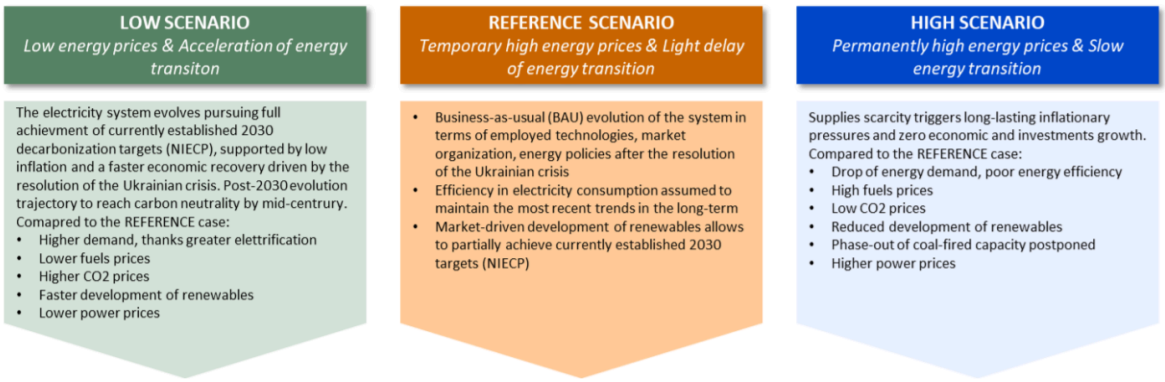
Current scenario update incorporates an evolution of climate variables in line with the historical average trend. In this perspective, we defined three scenarios:

- The **High Case scenario** is characterized by permanently high prices amid import-export tensions, supply scarcity and possible logistic locks. Negative or zero economic growth and the energy transition process failure would follow because of investments disruption.

- In the **Reference scenario**, prices remain high in the short-term since still low supplies combines with demand growth. However, the energy transition process continues leading to a progressive diversification of energy sources. This, combined with efficiency and high prices induced savings leads the energy market towards a normalization path. The economic growth suffers a contraction over the next two years, followed by recovery.

- The **Low Case scenario** would materialize in the event of favourable weather conditions and a fast energy transition, supported by low inflation and a faster economic recovery, reducing demand over the next few years.

This would limit prices upside potential and then fuel a downward acceleration.



1.1 Scenario highlights

Short-term perspectives for Italy have relaxed compared to the recent past, although tensions on energy markets are still possible given the fragile equilibrium on gas market: intensified competitive dynamics between Europe and Asia could drive prices up on the electricity market as well.

Relaxation in market fundamentals, a significant slowdown in economic growth and still subdued power demand are the key determinant for the electricity prices easing expected for the 2024-2025 period. Ongoing consumption trends appear to confirm a positive impact of the energy crisis on the acceleration of energy-saving investments and more flexible behaviours on the energy demand side. Whether the overall decrease in power demand dealt with short-term electricity savings or structural efficiency measures is still under observation, but effects are accounted for in near-term demand projections.

Contraction in electricity demand (-10 TWh y/y), recovery in hydro generation after the severe drought during the first months of 2023, an higher than historical level installation rate in renewable guarantied an increase in RES quota (30% of demand, +22% y/y) in the energy mix affecting the competitiveness for gas generation units. Furthermore, electricity demand contraction also in the other European countries, rebound in hydro generation together with an improved availability of French nuclear fleet increase the potential export flows from interconnected countries, resulting in an increased net import from the northern border (+10 TWh y/y). In the coming years the expectation of a slow recovery in

electricity demand, below 2019 level until 2026, and a sustained pace of renewable installations (+3.5 GW per year in Reference scenario and +6 GW in the Low scenario) may intensify market competition for gas-fired power plants.

In 2023, a notable increase in renewable installation rate (+5.7 GW compared to 1.5 GW/y during the last 5 years), driven by solar technologies, marks a further step towards the net zero path in the long run, despite a still uncertain economy recovery; permitting process simplifications, attractive market signals and investment costs reduction, driven by supply chain recovery may further accentuate the trend.

The Italian 2024 GDP growth is expected to remain almost close to zero in the Reference scenario, since inflation and restrictive monetary policies weigh on economic growth, while a recovery of demand and investments should sustain GDP growth in 2025 and for all the scenario years. In the High case the pessimistic macroeconomic view (-0.5% y/y) for the GDP in 2024 and the overall deceleration in growth in the ensuing years, undermines the system's potential.

The inflation trajectory will play a crucial role in defining the economic outlook performance. Private consumptions and industry investments persist in subdued, curbing growth projections in the short term. However, a possible faster normalization in inflation may speeds-up monetary policy normalization, supporting investments leading to our LOW Case scenario, with the GDP growth moving back to just below 1% (y/y) already in 2024.

Continuous relaxation in gas market dynamics over 2023 have favoured the easing in global prices. Favourable weather conditions, with subdued demand, abundant storage facilities, and stable supplies have guaranteed market stability in the short-term. The European market equilibrium remains delicate though, depending on LNG imports, strongly affected by competition with Northeast Asia. A faster recovery in Chinese industrial and transport sector pushed LNG demand in 2023, +10% y/y. Additionally, intensified competition driven by pricesensitive buyers in Asia could amplify market volatility, influencing price trends until 2025. By then, the availability of new liquefaction capacity should expand the global LNG demand-supply margin, mitigating potential tightness risks.

The gas price forecasts were revised in the short-term following the relaxation in market fundamentals and the significant slowdown in economic growth in Europe. TTF and PSV yearly price projections in the REFERENCE scenario average around 50 €/MWh for 2024 and decline towards 35 €/MWh in 2025 when liquefaction and regasification capacity should rebalance the supply-demand dynamics. If the global economic recovery stall and no competition arise on gas supplies, the gas prices decline may continue, with the PSV averaging below 30 €/MWh in 2024 as in the Low case, while in the High scenario an escalation of geopolitical tensions and increased competition on LNG supplies may emphasize the market upward potential with the yearly PSV averaging 80 €/MWh.

In 2024, the average CO2 price is should to approach €90/ton, driven by the gradual implementation of reforms within the ETS system, supporting the CO2 prices. The gradual integration of the maritime transport sector into the ETS scheme, as outlined in EU Directive 2023/959, is expected to unfold incrementally, potentially lacking a substantial impact on allowances demand in the short run. However, a notable divergence between supply and demand is projected to emerge around 2027 as the maritime sector fully integrates into the ETS system, leading to a tight market, with CO2 prices forecasted to surge towards an average of €110/ton by 2030. In 2023 electricity consumption curbs to 306 TWh but it is expected to eventually resume in 2024 reaching 311 TWh driven by recover in consumption and electrification. A moderate economic growth, driven by supportive measures, and quicker, but yet limited electrification allows the demand to reach 340 TWh in 2030. Acceleration of end-use electrification and full unfolding of efficiency potential driven by a more positive economic outlook in the LOW Case scenario should overcome the 2023 drop, and reach 313 TWh in 2024 (still below 2022 result) and head to the 360 TWh in 2030. On the contrary, in the HIGH case scenario, halted efficiency investments and slow economy recovery should keep power demand below 2022 level during 2024-2025 period, potentially growing up to 328 TWh in 2030.

The enhanced availability of France's nuclear fleet, coupled with a full recovery in hydroelectric generation across Europe, should ensure a stable energy net import flow of around 40 TWh towards Italy. In perspective, the gradual phase-out of coal-fired and nuclear capacity in the continental Europe could drive the sharp reduction of imported energy in the post-2030 horizon1. French nuclear fleet availability remains a central variable for the power exchange dynamics in Italy and phase-out decisions should drive the potential decline of net import form Northern borders after 2030 if not replaced by investments in new nuclear generation capacity.

Renewables gain share rapidly as the 2023 momentum is expected to enhance over the coming years, with a yearly increase up to 6 GW (4.5 GW of solar and 1.5 GW of wind) in the Low scenario and 3 GW (2 GW of solar and 1 GW of wind) in the Reference case, still below the NIECP average annual target of 8 GW necessary to reach the 2030 targets. Improved regulation, decreasing investment costs and ETS price signals should support the market parity conditions in the long run. The share of demand covered by renewables in 2030 reach almost 50 % and 60% mark in the REFERENCE and the LOW case respectively, while remains close to 40% in the HIGH case. Zonal distribution of the new capacity additions follows the patterns revealed by Terna's connection request database, and new utility scale projects are expected to concentrate mostly in the Southern macrozone and the two islands. Growth of small-scale distributed renewables for self-consumption is more concentrated in the Norther area following the historical path with 6% annual increase. Grid expansion reflect Terna's 2023 Development Plan indications. In the REFERENCE case reinforcements are assumed operational already in the 2020s but the main improvements to resolve zonal congestions are expected to be completed in the 2030s – Tyrrhenian link and Adriatic link as well as first portions of the Hypergrid. Faster penetration of renewable energy in the LOW case

would require the realization of the main projects even before 2030, while the slower system transition in the HIGH case postpone the key investments to the middle of the 2030s.

The need to boost energy independence in the decarbonization process at European level has already put hydrogen at the central stage of the future European energy strategy (REPowerEU) and could result in the allocation of significant financings – way more than the amount currently earmarked – to accelerate the development of a European hydrogen supply chain, improving current cost perspectives of green solutions. But accelerating renewables development materializes the risk of structural overgeneration if the development of BESS does not progress concurrently, especially in areas that are less interconnected with the rest of the system and have a high intensity of renewables relative to demand, such as Sardinia and La Sicilia in Sardinia and Sicily where economically viable opportunities for competitive green hydrogen consolidate starting from 2035.

By 2030, significant overgeneration and curtailment risks are expected to arise in the Southern zone and the Islands, which will prompt a surge in new electrochemical storage projects. Depending on the alternative scenarios of RES and grid development trajectories, these dynamics may be accelerated or delayed. Long-term development of batteries should follow the opportunities for time-shifting applications on the day-ahead market.

Investments in power intensive electrochemical batteries can be in-the-money in the medium-term, with revenue streams deriving mainly from the participation in the balancing phase of the Ancillary Services Market and a long-term capacity remuneration through specific projects. Investments in merchant energy intensive storage batteries are likely to be attractive only in the long-term when time-shifting applications on the DAM could become economically sustainable thanks to increasing price spread volatility and the presence of overgeneration. In 2040, up to 22 GW of energy intensive batteries are expected to be developed in our REFERENCE scenario.

In the REFERENCE scenario gas-fired generation is expected to remain at the backbone of the national energy mix even after renewables become the first production source through the next decades, until 2031 when RES become the main resource in the mix. Its share in the generation mix should decrease progressively but stay close to 30% of the national electricity needs until 2040.
However, mutated market conditions, triggered by the geopolitical tensions and contingent factors witnessed during the last year and a half, combined with implications of market design and regulation evolution (XBID, Terna's Incentive scheme, TIDE reform) unveil a changed market landscape context that is expected to permanently change the structure of revenue flows for gas-fired power plants.

Presence of coal units in the generation mix combined with the power demand slowdown are expected to partially limit the day-ahead market operativity of gas power plants and to reduce their margins in the 20242025 period, further worsened by the structural and permanent reduction in ASM volumes. In the longer run, after 2026, despite the entrance of less new generation CCGTs through the capacity market, competition for existing units should increase, further exacerbated by continuous acceleration in renewables development, but to be also partially compensated by coal phase-out of generation units in the Italian peninsula2 and by import reduction after 2030. The clean spark spread, which is strictly related to the evolution of existing CCGTs market share that remain the technology fixing the prices in most hours, remains negative on baseload basis, but the flexible operation of gas fired assets allows to optimise the actual captured value. Even though volatility and competitiveness increase, the day-ahead market remains the primary source of revenues for CCGTs. Missing money issues could arise for part of the existing CCGT fleet and the extension of a Capacity Remuneration Mechanism only for existing capacity could mitigate the risk of a non-adequate system.

Market prices in the short-term will mainly be guided by commodities prices dynamics. A gradual normalization of gas prices can be reflected in the power prices in the mid-term. In the long-term, power prices will be mainly driven by CO2 movements, while the impact of other commodities are expected to reach a stable equilibrium. Renewables penetration, mainly led by solar energy, is expected to strongly affect peak/off-peak dynamics after 2030, when the inversion of price spreads between time slots is expected to occur. Zonal spreads reflect the disruptive variations of the generation mix and grid in the three alternative views. In the short term, the REFERENCE case predicts that zonal prices will diverge due to the cost-effectiveness of coal production in specific areas. However, over the long term, the significant development of renewable energy sources in the southern macro-zone is expected to drive prices down through the cannibalization of solar technologies. Despite anticipated grid improvements, bottlenecks are still expected between the northern and southern zones, resulting in differing price levels in the 2030s. From 2035 onwards, further grid reinforcements are assumed to occur, resulting in a reduction of inter-zonal congestion issues on the mainland. However, criticalities are likely to remain evident in the islands.

Systematic and significant contraction of volumes exchanged on the ancillary services market has been observed since mid-2021 for both upward and downward operations. At the basis of the new trend there are multiple drivers that are expected to change the role and the perspective of the ancillary services market. The origin of the new trends is actually a combination of factors with less or more contingent nature such as: available running reserve due to reversed switching conditions, evidence for changes in the network management criteria adopted by Terna potentially connected to the incentives for ASM cost reduction, feasibility intervals imposed to power plants in the new Intra-Day Market continuous structure. The traditional market phase for regulation services is expected to become riskier and tighter, and to offer only a marginal integration to the spot market profits. Limited room is expected to remain a permanent trend in the long run, further supported by the commissioning of additional flexible thermal and storage capacity. Delay of grid investments with respect to the renewable growth could impact on the security condition with a wide heterogeneity at nodal level: local

criticalities and limited renewable hosting capacity could be mitigated by storage waiting for structural network reinforcements.

The new long-term scenario analysis of MBS takes into consideration the latest trends of the Italian system evolution, it peers itself with the Fit-for-55 targets in 2030 and discusses the possible paths towards 2050. Market simulations are extended beyond 2040 by explicitly modelling the market fundamentals through deterministic techniques and by assuming an inertial evolution, in line with the average 2030 – 2040 trajectory, for renewables installation sustained by BESS technologies, reduction in gas generation quota in the energy mix, electrification of consumptions and a proportional gird development on top of Terna development plan. All the elaborations are done considering the market structure and rules as known of today.

The resulting trajectory lacks behind the Net Zero targets: by 2050, only 85% of Italian electricity demand is expected to be met by renewable generation, while the residual demand would be covered by flexible and efficient gas generation, still needed by the system for adequacy reasons. Further contraction in operating hours (morning and evening peaks) impose the need of an explicit remuneration mechanism to support their economic viability. Renewables are expected to become the predominant marginal technology and market prices are expected to become less dependent on gas generation costs and more related to LCOE of renewable technologies as their marginal quota reach 40% of the yearly hours.

For evaluating price dynamics beyond 2050 (2050-2060 horizon),we assume an extension of 2050 results taking into account the uncertainty of available information for an explicit evaluation of the very long-term. 2040 -2060 scenarios will be carefully evaluated in future updates in order to discuss the economic sustainability of policy scenarios implementing the net zero target.

Key market trends in Italy

		mid-2021 - 2022	2024 - 2025	2026 - 2030	2030 - 2040	2040 - 2050
Main market drivers	Demand	↑	↓	↑	↑	↑
	Coal share	↑	↑	↓	↓	↓
	Import	⇆	⇆	↓	↓ ↓	⇆
	RES-E	↑	↑	↑	↑ ↑	↑ ↑
	New CCGT	↑	↑	⇆	⇆	⇆
Main market trends	DAM	High price volatility and low hydro availability supported the DAM results despite coal/oil competition	Competitive conditions persist driven by market tensions and demand reduction	Load factors improve slightly with coal phase-out	Despite the RES-E acceleration, operation of gas-fired plants maintains its share supported by reduction of import from the Northern border	RES quota in the energy mix overcome 80%, only the most efficient CCGTs remain active, with operativity condensed during peak demand hours
	ASM	Reduced ex-ante volumes caused a drop of profits from ancillary services sales and energy shifted to the day-ahead session	Opportunities for gas-fired capacity remain limited as overall volumes remain low and new flexible assets (new CCGTs and BESS) join the market			
	CRM	2022 as the first year of operation for the CRM	2023-2024 CRM premium should partially compensate limited revenues on the spot market	Missing money issues could arise for part of the existing fleet, extension of CRM only for existing capacity could mitigate the risk		Reduced participation in the energy market drastically affect plants marginality, CRM is needed to maintain the units active

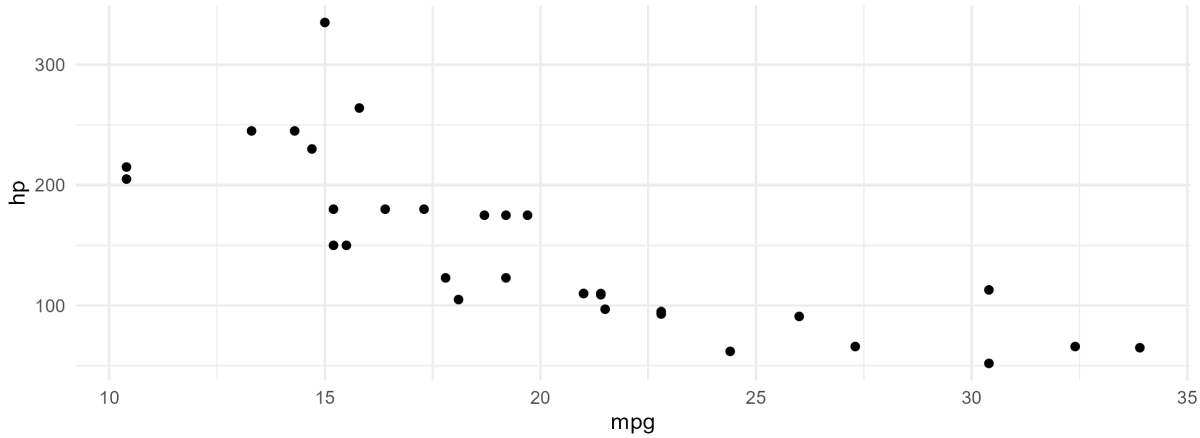
2 Key Figures

NET	Reference				Low				High			
POWER	2025	2030	2040	2050	2025	2030	2040	2050	2025	2030	2040	2050
CCGTs (GW)	28,1	28,0	23,8	18,0	28,1	28,0	23,8	18,0	28,1	28,0	25,0	18,0
Coal-fired Units (GW)	2,5	<NA>	<NA>	<NA>	2,5	<NA>	<NA>	<NA>	3,1	0,9	<NA>	<NA>
Hydro (GW)	19,0	19,3	20,0	20,6	19,0	19,3	20,0	20,6	19,0	19,3	20,0	20,6
New CCGTs (GW)	7,3	7,3	7,3	7,2	7,3	7,3	7,3	7,2	7,3	7,3	7,3	7,2
Other RES (GW)	4,7	4,7	4,7	4,7	4,7	4,7	4,7	4,7	4,7	4,7	4,7	4,7
Solar PV (GW)	35,2	49,0	77,7	112,3	39,9	63,0	87,0	112,3	31,6	37,1	47,6	77,7
Storage EI (GW)	2,7	13,1	29,4	40,8	3,4	17,0	30,4	45,1	2,2	7,6	13,2	19,0
Storage PI (GW)	1,7	2,0	<NA>	<NA>	7,0	3,4	<NA>	<NA>	0,8	1,0	<NA>	<NA>
Wind (GW)	13,3	15,6	22,8	32,4	14,5	18,6	22,4	29,4	12,5	14,0	19,3	22,8

3 Macroeconomic Context

3.1 GDP

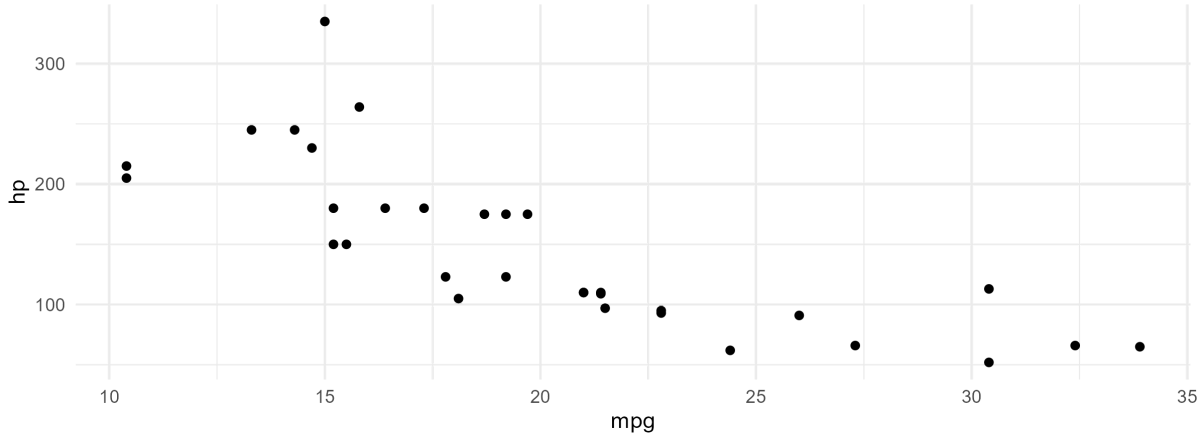
GDP GROWTH IN THE SHORT-TERM REMAINS SUBDUED, AMID MONETARY TIGHTENES AND GLOBAL DEMAND SLOWDOWN. THE PERSISTENCE OF INFLATION, FISCAL POLICY DECISIONS, THE EFFECTIVENESS IN IMPLEMENTING THE RECOVERY PLAN, AND THE EVOLUTION OF THE INTERNATIONAL CONTEXT ARE THE MAIN DRIVERS BEHIND MID AND LONG TERMS PRESPECTIVES



24-25	The PSV-TTF spread is still seen as remaining positive in short term, just below 2 €/MWh on average, with some variability across the year depending on the season, as the reliance on flows from Northern Europe via Passo Gries is still pivotal to the Italian gas demand coverage.
26-30	Flows from the TAP and Algeria, and LNG arrivals are seen as balancing imports in the medium-term, leading to a progressive spread closure to below 1 €/MWh by 2030.
31-50	The PSV-TTF spread is foreseen to reabsorb towards zero in the long-term, since a gradual flows rebalancing is expected to combine with the underlying decarbonization-induced demand reduction
Main updates	PSV-TTF spread is still expected to remain positive in short and medium term and to reduce progressively towards null in the long-run. A slight reduction of the short-term PSV-TTF spread average followed the aforementioned downward revisions of gas prices.

3.2 Inflation rate

THE ENERGY PRICES SLOW DOWN GUIDES THE YEAR-ON-YEAR DECREASE OF THE GENERAL PRICE INDEX, BUT CORE INFLATION IS PROVING PERSISTENT. MONETARY POLICY TIGHTENING PROVED TO BE EFFECTIVE IN KEEPING MEDIUM AND LONG TERM INFLATION EXPECTATION UNDER CONTROL



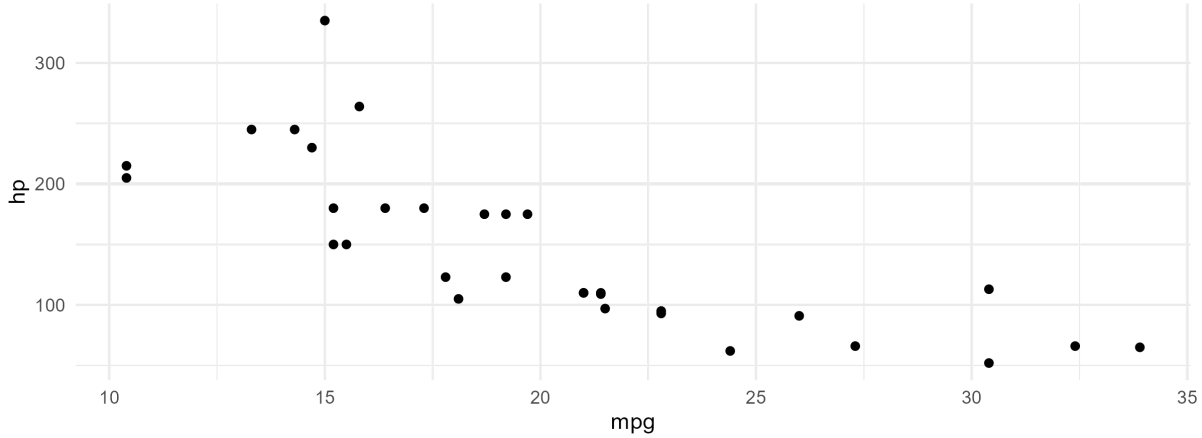
24-25	Our scenario foresees inflation to increase by 1.7% in 2024 and by 2.3% in 2025, as carry-over effects and energy prices' spillovers to other sector gradually weaken and economic activity remains subdued.
26-30	After 10 consecutive reference rates increases, the ECB considers the current monetary conditions capable of guiding inflation back to the 2% medium term target if kept for a sufficiently long period of me. Our scenario assumes the monetary policy succeed in gradually bringing back inflation to its target in the second half of the decade.
31-50	Long-term assumptions envisage the inflation rate to stabilize at around 2%, in line with the BCE's medium term inflation target.
Main updates	GDP projections are in line with the previous market update.

4 Commodities

4.1 Natural Gas

4.1.1 LNG

2024 GLOBAL LNG DEMAND REMAINED HIGH, CLOSE TO 2023 LEVELS. THE DEVELOPMENT OF NEW REGASIFICATION CAPACITY WORLDWIDE SHOULD SUPPORT FURTHER LNG DEMAND GROWTH IN THE SHORT-TERM. AFTER 2025, A POTENTIAL OVERSUPPLY LNG MARKET IS EXPECTED, PROVIDING THE BASIS FOR A PRICE NORMALIZATION

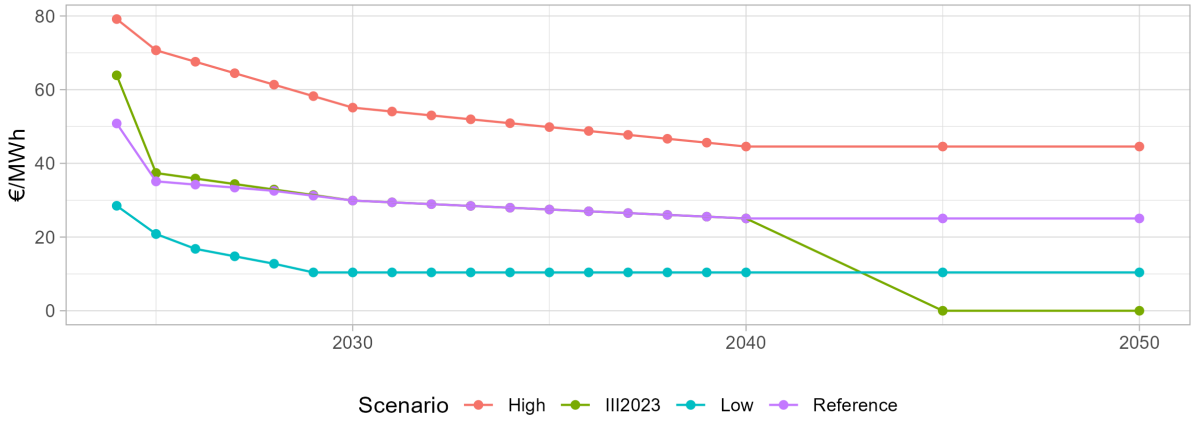


::::{.callout-item} :::{.callout-left} #### 24-25 {-} ::: :::{.callout-right} 2023 global LNG demand growth registered a +2% y/y increase, with Europe and Asia having represented the major desnaon markets. An overall +2% yearly recovery is foreseen also in 2024, resulng from incoming new regasificaon capacity worldwide. European LNG intake is expected to remain sustained in the short-term to ensure reliable and affordable energy supplies, reaching +6% y/y in 2024. 2023 Chinese LNG demand growth rate remained close to +10% y/y, following a faster than expected recovery of the Chinese industrial and transport sectors. LNG deliveries to China should grow also in 2024, but at a slower pace (+5% y/y) with ramping up Russian deliveries via the Power of Siberia pipeline entering the market. Compeon should be intense also in 2025, when the world regasificaon plants will work at their maximum capacity, leading the global LNG demand growth to accelerate above +5% y/y. ::: ::::

26-30	Only after 2025, when the new super-cycle of LNG supply from US and Qatar will begin to flood the market, the global LNG demand-supply margin would widen beyond 15%, providing the basis for a full normalization of prices.
31-50	In the long-term, pressure on the LNG market is expected to ease, with new capacity growing and green energy commitments becoming effective.
Main updates	Global LNG demand growth in the short term remained substantially in line with our previous market update. 2024 European LNG demand growth was revised slightly lower since record high gas storage should slowdown demand recovery over the next few months, while the Asian one was revised higher to take into account a faster than expected recovery of price-sensitive importers.

4.1.2 TTF Price

SHORT-TERM MARKET FUNDAMENTALS RELAXATION REFLECTED ON EUROPEAN GAS PRICES, WHICH DOWNED COMPARED TO 2023 AVERAGES. HOWEVER, FURTHER TENSION ON PRICES AND VOLATILITY PEAKS OVER THE NEXT COUPLE OF YEARS, ESPECIALLY IN WINTERS, CANNOT BE EXCLUDED. IN THE LONG-TERM EUROPE DECARBONIZATION PROCESS WOULD KEEP REDUCING DEMAND, PRESSURING DOWNWARD PRICE ACTION



24-25

The TTF 2024 average price settled just above 30 €/MWh, in line with our Reference scenario's expectations, due to the persistently easing of market fundamentals resulted by the combination of subdued demand and record-high gas storage across Europe. As the European regassification capacity deployment will increasingly enable further LNG arrivals, prices may move higher amid restoring competition with Asia on securing supplies, leading the 2025 TTF yearly average close to 33 €/MWh consequently. A gradual normalization is expected from 2025 on wards following the significant stationing of new liquefaction capacity, with the TTF gas prices moving just above 35 €/MWh.

26-30

Under the assumption of a progressive normalizing of the world LNG market combining with an acceleration of the energy transition, the European gas prices would move gradually lower towards 30 €/MWh in 2030.

31-50

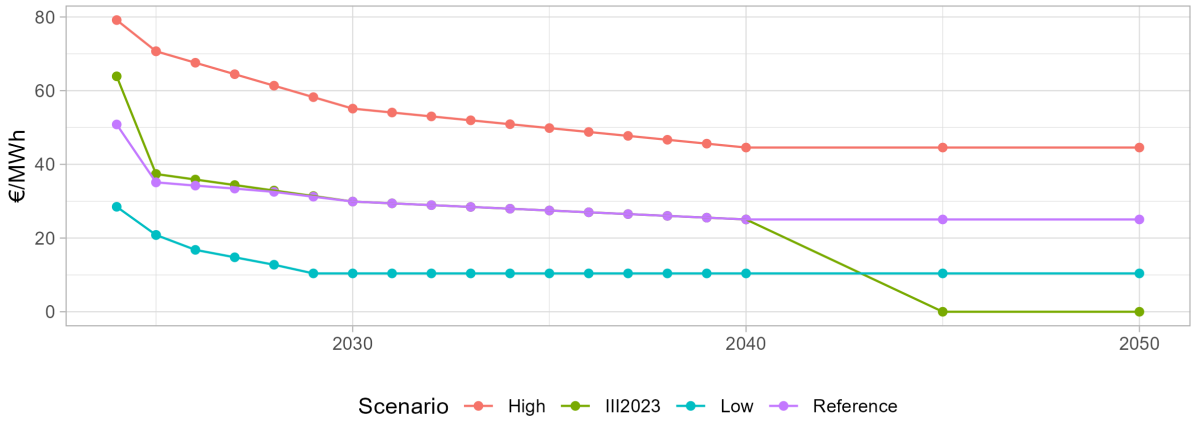
European decarbonization process would keep reducing gas demand, pressuring the price action back towards the 25 €/MWh long-term equilibrium. Only in the High scenario, persisting geopolitical and commercial tensions would leave commodities shortages unresolved, leaving prices just below the 50 €/MWh threshold in the long-term. Effective green policies supported by economic growth may lead prices significantly lower in the Low scenario, with the TTF averaging near 10 €/MWh in the long-term.

Main updates

Our short-term expectations on the European gas hubs prices were revised lower, mainly across 2023-24 and 2024-25 winter seasons targets, following the recent relaxation of short-term market fundamentals and a significant slowdown in economic growth in Europe.

4.1.3 Spread TTF-PSV

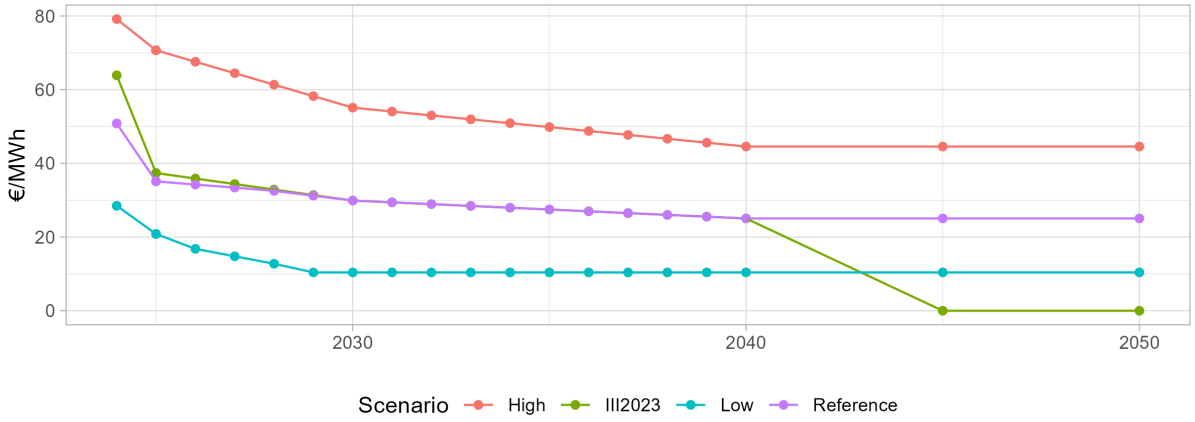
IN THE SHORT-TO-MEDIUM TERM THE PSV GAS PRICE IS EXPECTED TO REMAIN AT PREMIUM COMPARED TO THE TTF, AS GAS FLOWS FROM NORTHERN EUROPE ARE NEEDED TO COMPENSATE FOR THE LACK OF RUSSIAN SUPPLIES TO COVER THE ITALIAN GAS DEMAND. THE SPREAD SHOULD PROGRESSIVELY CLOSE TOWARDS ZERO IN THE LONG RUN THOUGH



24-25	The PSV-TTF spread is still seen as remaining positive in short term, just below 2 €/MWh on average, with some variability across the year depending on the season, as the reliance on flows from Northern Europe via Passo Gries is still pivotal to the Italian gas demand coverage.
26-30	Flows from the TAP and Algeria, and LNG arrivals are seen as balancing imports in the medium-term, leading to a progressive spread closure to below 1 €/MWh by 2030.
31-50	The PSV-TTF spread is foreseen to reabsorb towards zero in the long-term, since a gradual flows re-balancing is expected to combine with the underlying decarbonization-induced demand reduction
Main updates	PSV-TTF spread is still expected to remain positive in short and medium term and to reduce progressively towards null in the long-run. A slight reduction of the short-term PSV-TTF spread average followed the asaforemenoned downward revisions of gas prices.

4.1.4 PSV Price

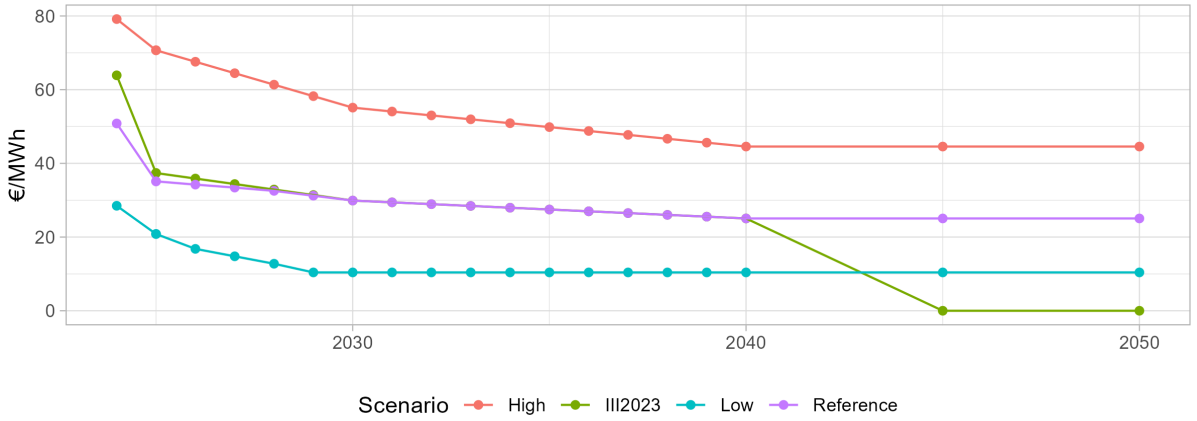
THE ITALIAN GAS PRICE DYNAMICS REMAIN STRICTLY RELATED TO THE EUROPEAN ONES, WITH THE TTF DETERMINING THE PSV MAJOR TREND. THE PSV IS THEREFORE PROJECTED TO ALIGN WITH THE EUROPEAN PRICES NORMALIZATION PATH, TARGETING 30 €/MWH BY 2030 AMID A GRADUAL REBALANCING OF GLOBAL GAS DEMAND AND SUPPLY RESULTING FROM THE ACCELERATION OF THE ENERGY TRANSITION



24-25	The 2023 PSV average price settled just below 45 €/MWh in 2023. In 2024, with the fully operational Piombino Floating Storage Regasification Unit (FSRU) and the new Ravenna FSRU (expected to become operational by the end of 2024) supporting the gas demand recovery, the PSV yearly average should move higher, staying above 50 €/MWh. In the High scenario, further escalation of geopolitical tensions, increased competition on LNG supplies and/or limited Norwegian flows combining with lower than average winter temperatures would emphasize the market upward potential, with the yearly PSV averaging 80 €/MWh in 2024. Should the global economic recovery stall and no competition arise on gas supplies as both European and Asian demand remain muted instead, the gas prices decline may continue, with the PSV averaging below 30 €/MWh, as represented in the Low scenario.
26-30	The PSV is expected to follow the European gas prices mid-term normalization towards 30 €/MWh by year 2030, as a gradual re-balancing of the global gas demand-supply dynamics should follow the expected acceleration of energy transition.
31-50	The PSV Reference price is expected to stabilize, aligning to TTF prices at around 25 €/MWh in the long- term.
Main updates	Our short-term expectations on the European gas hubs prices were revised lower, mainly across 2023-24 and 2024-25 winter seasons targets, following the recent relaxation of short-term market fundamentals and a significant slowdown in economic growth in Europe.

4.1.5 Logistics Costs for Italian Gas-Fired Units

GAS LOGISTIC COSTS ARE EXPECTED TO REMAIN HIGH IN THE SHORT-TERM DUE TO THE INCREASE RELATED TO THE COVERAGE OF STORAGE INJECTIONS ACTIVITY IN PARTICULAR. VARIABLE LOGISTIC GAS COSTS SHOULD START GRADUALLY DECREASING FROM 2027 ONWARDS, FOLLOWING THE EXPECTED GAS PRICES NORMALIZATION



24-26

The 2023 logistic cost for Italian gas-fired units averaged 4 €/MWh amid the increase of the CRVOS (which pays storage injections incentives), CRVBL (which covers the charges associated with the gas system balancing activity) and the CVU (which covers variable charges and it's linked to the gas price trend) components. With the Consultation Document 588/2023/R/gas ARERA is evaluating the introduction of a Neutrality Charge of 2.2 €MWh from April 2024 (and for at least 3 years) to recover almost 4 Bln€ derived from the summer 2022 last resort buying activity put in place to refill the Italian storage. The overall gas transport cost should therefore remain above 4 €/MWh at least unl 2026. The CRVOS component should reduce close to pre-crisis levels starting from October-2024 instead.

27-50

A gradual normalization of the average variable logistic costs is expected from 2027 on wards, following the normalization of gas prices, nearing 1.6 €/MWh on average by 2030.

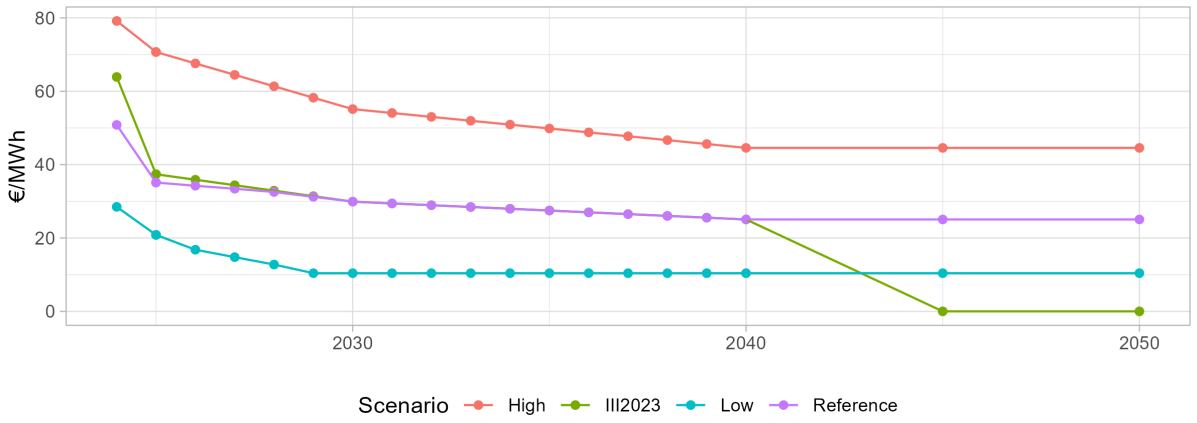
Main updates

The variable transport charges forecast incorporates the regulator interventions to mitigate the recent commodities surge on bills, compensated by an increase in storage and balancing cost.

4.2 EU ETS

4.2.1 C02 Allowances Price

THE NEW ETS REFORM, FORMALLY ADOPTED IN APRIL 2023, AIMS AT PROGRESSIVELY LEADING THE CO2 PRICE UPWARDS BY TIGHTENING THE EMISSIONS CERTIFICATES MARKET THROUGH SUPPLIES CURTAILMENT OR DEMAND REINFORCEMENT. THE INCLUSION OF THE MARITIME SECTOR WILL ALSO ACCELERATE PRICES' INCREASE



24-25

In our Reference scenario, the 2024 CO2 price average should near 90 €/ton, with the gradual implementation of the ETS system reform supporting CO2 prices. The inclusion of the maritime transport sector in the ETS scheme (as set by the EU Directive 2023/959) will be gradual too, possibly not having a significative impact on the allowances demand in the short-term. Moreover, there are still concerns about the effective demand recovery, which should be limited over the next couple of years amid as a result of an expected slow economic growth.

26-30

A significant widening of the supply-demand gap should become evident from 2027 on wards, when the inclusion of the maritime sector in the ETS system will be in full swing, leading to a ght market, with CO2 prices accelerating towards 110 €/ton on average by 2030.

31-50

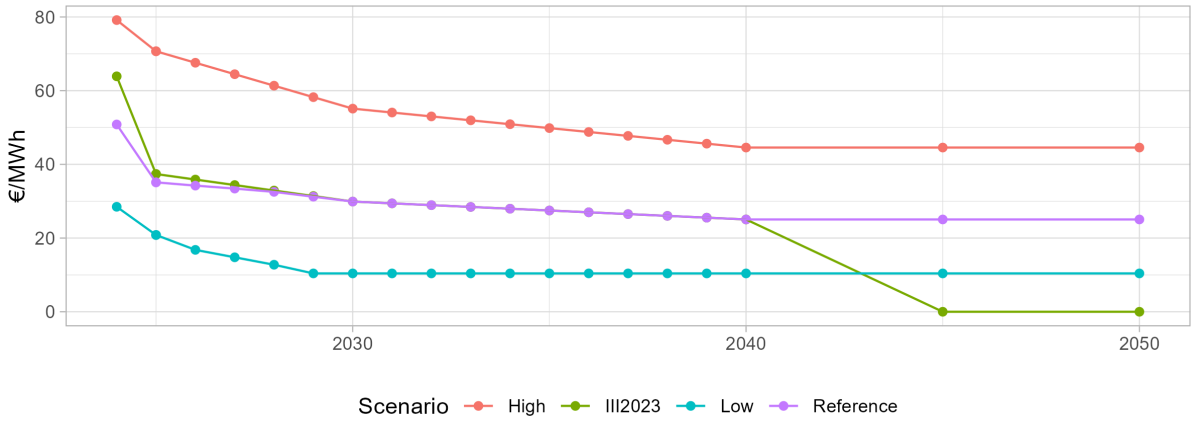
The long-term targets would still depend on the effective efficiency of the ETS System, with the CO2 price expected to target over 120 €/ton in the Reference scenario by 2040, and a possible acceleration just below 150 €/ton in the Low scenario, under the assumption of stricter decarbonization efforts in Europe to accelerate the prices increase.

Main updates

Our CO2 price targets for the very short-term were revised slightly lower compared to our previous update, with the gas market bearish dynamics still having an impact on the ETS system.

4.3 Coal Switching Price

STILL UNCERTAIN COMMODITIES MARKETS IN THE SHORT-TERM REVERSE SWITCHING CONDITIONS FOSTERING COAL-FIRED POWER PLANTS UNTIL 2025. GAS-FIRED GENERATION SHOULD RETURN THE MOST COMPETITIVE THERMOELECTRIC SOURCE AFTER YEAR 2025, AS A RESULT OF THE EXPECTED NORMALIZATION OF THE PSV GAS PRICE TOWARDS 30 €/MWh WITHIN 2030



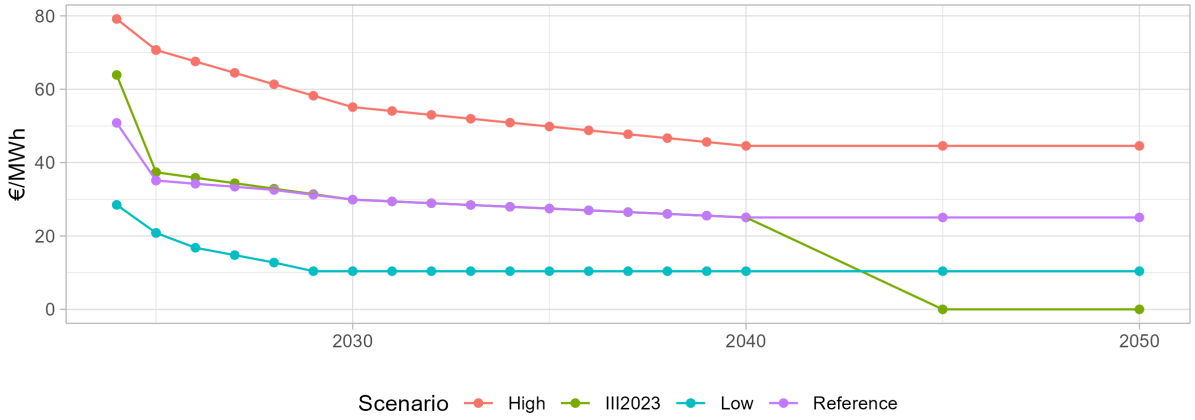
24-25	In 2023, the switching conditions were guaranteed for average efficiency coal plants (35%) to average efficiency gas ones (53%). However, following the expected increase in gas prices in 2024, switching conditions may be effective only from low efficiency coal plants (30%) to high efficiency gas plants (60%).
26-30	From 2025 on wards, gas fired thermoelectric generation is expected to gradually become economically favorable, with the eventual normalization of commodities markets and the acceleration of the ETS mechanism guaranteeing switching conditions even from high efficiency coal plants (60%) to low efficiency gas plants (50%) mainly after 2027.
31-50	The eventual normalization of commodities markets and the ETS mechanism guarantee switching conditions between high-efficiency coal-fired units and low-efficiency gas-fired plants also in the long-term, with rising CO2 prices and PSV quotations stable near 25 €/MWh.
Main updates	Switching conditions cotinnue to reflect the change in the short and mid-term commodities outlook, but the new ETS reform should support the CO2 price and lead to favorable switching conditions.

5 Energy Mix

5.1 Day-Ahead Market Energy Balance

5.1.1 Reference Scenario

THE REDUCTION IN THE ELECTRICITY DEMAND IS SUSTAINED BY A DECREASE IN COAL PRODUCTION. IN THE MID-TERM, GAS-FIRED GENERATION BECOMES THE PRIMARY SOURCE OF ELECTRICITY AS COAL PLANTS ARE PHASED OUT. IN THE LONG-TERM, RENEWABLES TAKE THE LEAD AS THE PRIMARY SOURCE OF ELECTRICITY PRODUCTION, SUPPORTED BY GAS-FIRED PRODUCTION



24-25

Reduction in electricity demand and recovery in hydro generation at national and European level stabilize the system needs, leading to the interruption of the coal maximization program. Gas generation remains the main generation source, continous installation of RES driven by solar technology increase renewable quota in the MIX.

26-30

The Capacity Market (CM) brings 7.3 GW of new thermoelectrict capacity and more than 1.5 GW of new storage capacity online between 2024 and 2025. In 2025, coal-fired units in the peninsula are phased-out, while Sardinian units remain operative for security reasons until the completion of the Tyrrhenian Link, in 2030. Renewables production growth hit almost 50% of demand in 2030. The progressive normalization of commodities prices drives the reduction of imported flows.

31-50

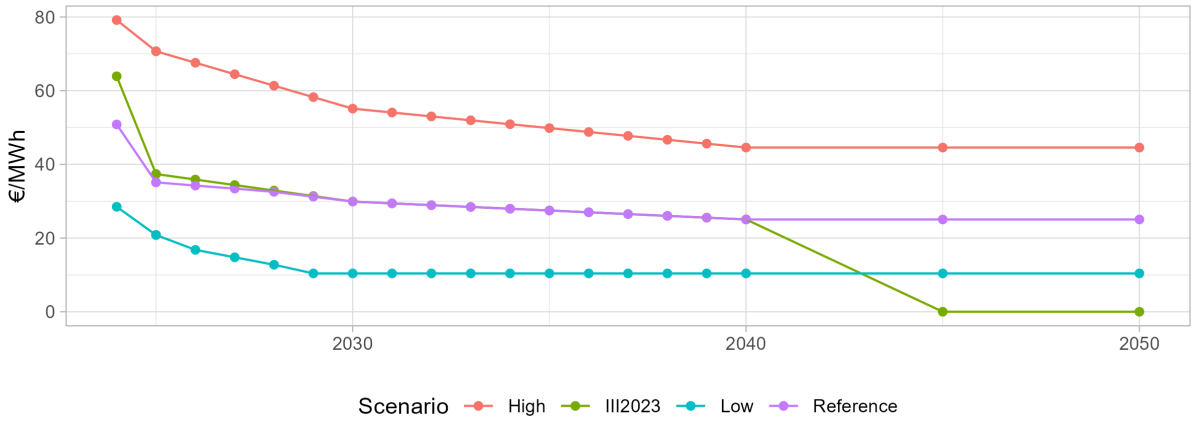
Further reductions of net import flows from the northern borders could be determined by the partial decommissioning of the ageing French nuclear fleet, the phase-out of German coal-fired capacity, and the realization of the Elmed cable (Tunisia-Sicily). Renewables become the main source in the mix, backed up by gas-fired production. Convenient market conditions would favor the development of energy intensive storage.

Main updates

Changes in the production mix reflect updated commodities in the short-term increased quota of RES after 2035.

5.1.2 Low Case Scenario

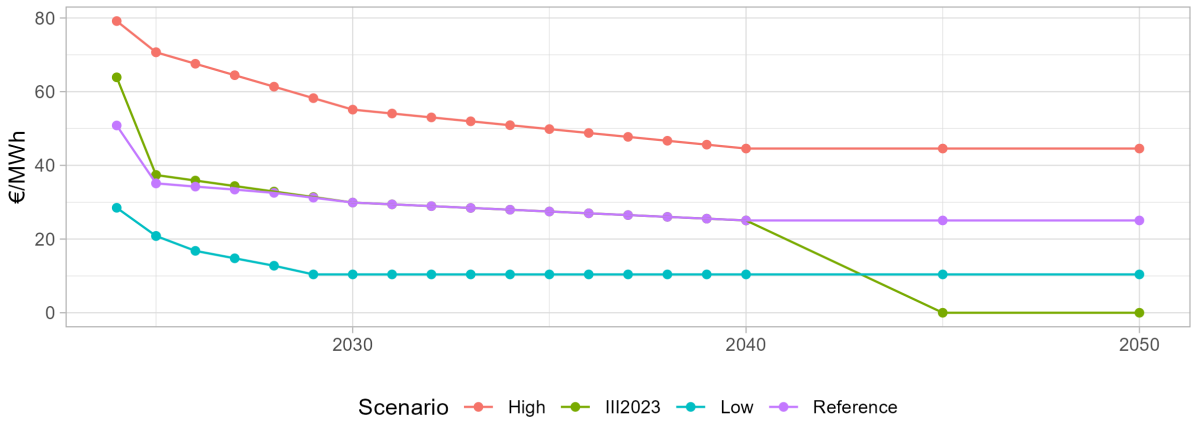
AS COMMODITIES MARKETS RAPIDLY NORMALIZE, THERE IS A GROWING COMMITMENT TO DECARBONIZE THE EUROPEAN ECONOMY. ROBUST SUPPORT FOR THE DEVELOPMENT OF RENEWABLES, WHICH COULD POTENTIALLY SURPASS THE CURRENT 2030 TARGETS AND SET THE SYSTEM ON A TRAJECTORY TOWARDS ACHIEVING CARBON NEUTRALITY BY MID-CENTURY



24-25	With commodities prices rebounding faster and an improved economic outlook, there is a renewed commitment to decarbonizing the economy. Facilitating the prompt resolution of authorization deadlocks for new renewable projects and encouraging investments in energy efficiency. Although coal units continue to operate, their share decreased due to more favorable conditions for gas. Gas-fired production reach 34% of the national electricity demand.
26-30	In 2029 coal-fired units in the are entirely phased-out. Falling renewables costs and a greater effort to reach decarbonizations goals support renewables development: in 2030 the ratio between renewable energy and total electricity consumption reach 59%. The combination of reduced fuel prices – affecting competitive dynamics between different production sources all over Europe – and the need to respect national grid security conditions drive the progressive reduction of imported flows.
31-50	In the very long-term, gas-fired generation and energy intensive storage systems back up non-programmable renewable production and guarantee system security and adequacy. Despite storage and network reinforcements the integration of renewables in the energy mix will only be partial reached as congestion and overgeneration problems are going to manifest, generating signals for electrolisis capacity.
Main updates	Changes in the production mix reflect updated commodities in the short-term. Thermoelectric capacity hypotheses consider the results of the latest Capacity Market auction, held in February 2022.

5.1.3 High Case Scenario

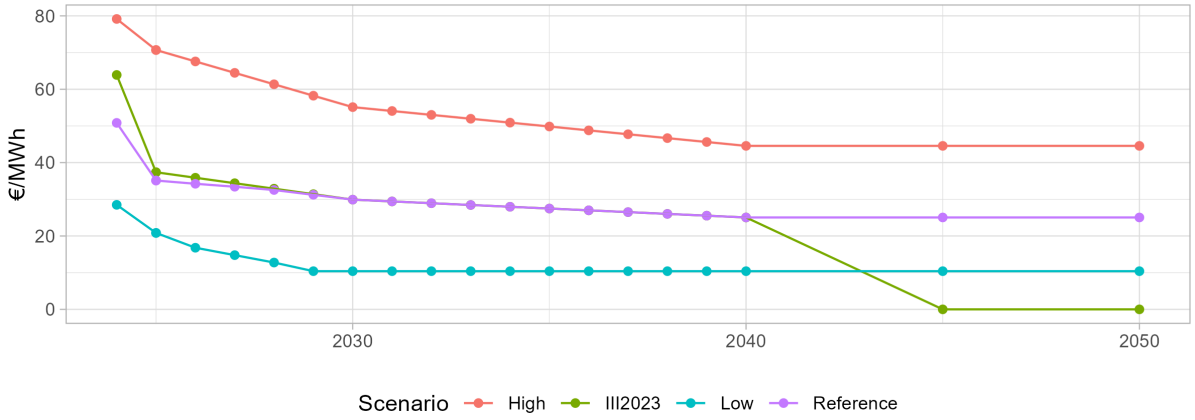
SLOWER AND LESS ROBUST ECONOMIC RECOVERY AFFECTS ENERGY MARKETS. IN THE LONG TERM THE ENTRANCE OF THE MAIN GRID INFRASTRUCTURE PROJECTS ALLOWS THE PHASE-OUT OF COAL UNITS. RENEWABLES AND BESS GRADUALLY INCREASE THEIR SHARES IN THE GENERATION MIX



24-25	Coal-fired units become essential to grant security, adequacy conditions and to reduce gas consumptions in a context of higher than historical price level. Coal-fired output reaches 10 TWh and gas-fired production reach around 31% of total electricity needs.
26-30	CM-led investments come online but the phase-out of coal-fired capacity is postponed, so as the realization of great network investments. Net imports remain stably above the 40 TWh threshold and gas-fired production maintains a 31% quota of total electricity needs, as hydro production normalize and renewable energy sources gradually increase their share in the mix
31-50	Increase in CO2 price reduce coal generation compeveness until 2035 when the entrance of the Tyrrhenian Link determine the phase-out of all coal units. Gas-fired production increases its share in the national energy mix to around 38%. Volatile DAM dynamics and RES development sustain the entrance of 10GW of energy intensive storage in the long-term.
Main updates	Changes in the production mix reflect updated commodities in the short-term. Thermoelectric capacity hypotheses consider the results of the latest Capacity Market auction, held in February 2022.

5.2 Electricity Demand

SAVING MEASURES IN THE SHORT-TERM ARE EXPECTED TO REDUCE DEMAND, TO BE EVALUATED IF IT IS GOING TO BE STRUCTURAL. IN THE LONG-TERM, ELECTRIFICATION AND EFFICIENCY IN FINAL CONSUMPTIONS BECOME THE MAIN DRIVERS OF ELECTRICITY DEMAND



24-25

Current scenario incorporate the registered decrease in power demand driven by electricity savings and efficiency measures. Ongoing trends appear to confirm the positive impact of the energy crisis on the acceleration of energy-saving investments and behaviors. In our 2023 Reference scenario, electricity withdrawals are therefore projected to decline to 308 TWh (-2% y/y), while demand eventually resumes in 2024, recording 311 TWh, in line with the foreseen economic growth resumption (0.1 % y/y).

26-30

In the Reference case, moderate economic growth is driven by supportive measures and electrification allowing demand to reach 339 TWh in 2030. In the Low scenario, stronger economic outlook and system electrification push demand slightly below 360TWh, while in the High scenario the lower economic recovery and electrification bring consumption at 327 TWh.

31-50

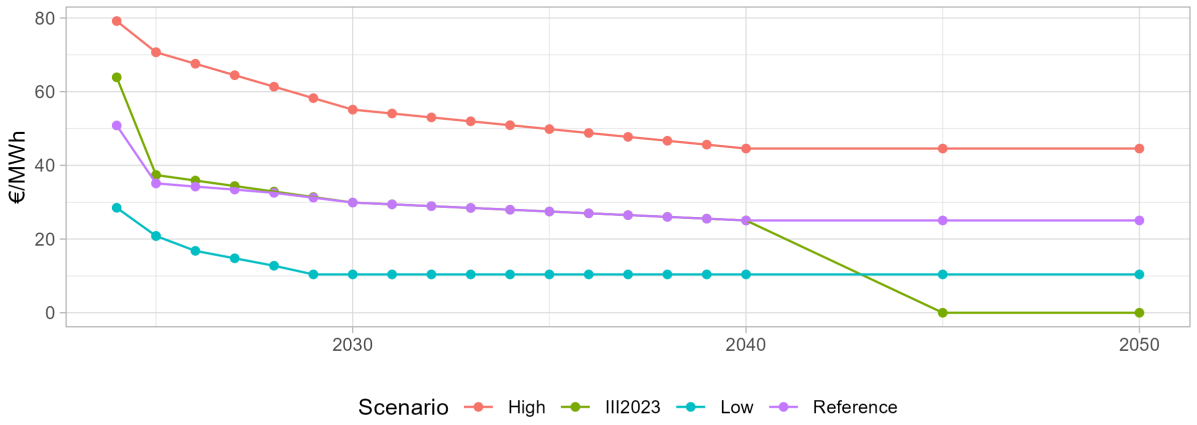
After 2030, the progressive electrification of consumption in the transport sector and the diffusion of heating and cooling appliances could be compensated by efficiency measures in the industrial and civil sectors. This could lead electricity demand below 370 TWh in 2040. In the alternave scenarios 2040 demand totals 377 TWh in Low case and 347 TWh in High case.

Main updates

Electricity demand hypothesis are in line with the previous update.

5.2.1 E-mobility

ADDITIONAL ELECTRICITY DEMAND FROM EVs CAN SIGNIFICANTLY VARY BASED ON THE FUTURE DEPLOYMENT OF E- MOBILITY APPLICATIONS IN CITIES, EMISSION REDUCTION OBJECTIVES IN TRANSPORTS AND GENERALLY ON LONG- TERM TRANSPORT HABITS



24-40

Electric vehicles are assumed to increase up to 1.2 million in 2025, 4.5 million in 2030 and 11 million in 2040, bringing 2 TWh, 7.6 TWh and 18.7 TWh of additional consumption, respectively. In the Low scenario, a greater diffusion of electric vehicles leads 10.5 million in 2030 and 14 million in 2040. In the High scenario, e-mobility development suffers a 5-year delay compared to the Reference case.

30

The NIECP envisages 6 million electric vehicles in Italy in 2030 - 4 million are pure EVs (BEV: Battery Electric Vehicles) – accounting for about 8 TWh of additional electricity demand. In our Reference view we estimate additional 7.5 TWh to come from BEV and PHEV (Plug-in Hybrid Electric Vehicle). This means that our hypotheses consider a greater consumption per EV compared to NIECP figures. Main differences are most likely connected to the underlying assumptions about e-mobility applications in cities or long-term transport.

31-50

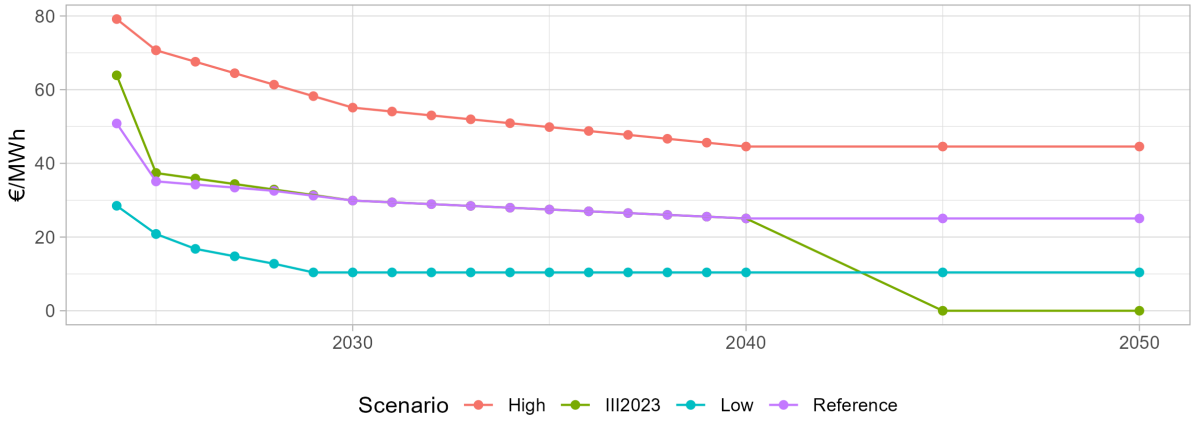
Notwithstanding the newest Green Deal proposals at EU level concerning transports, considering the uncertainty connected to the future expansion of a market which is still in a first stage of development, we assume a BAU trend in the long-term horizon, starting from the annual level of EVs addition reached in 2030.

Main updates

Development of EVs in line with previous market update, considering a potentially accentuated sensitivity towards sustainability goals in the post-pandemic recovery and especially from 2030 on with the likely strengthening of EU standards.

5.2.2 Heating and Cooling

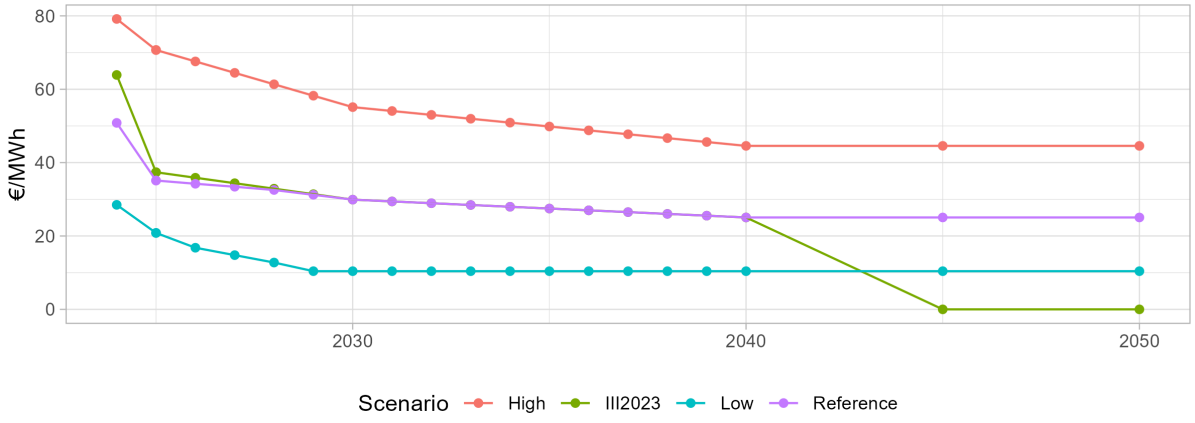
THE ADDITIONAL ELECTRICITY DEMAND FOR HEATING AND COOLING WILL DEPEND ON THE PACE OF GROWTH OF INSTALLATIONS FOR CIVIL AND INDUSTRIAL USES, POTENTIALLY SUSTAINED BY SUPPORT MEASURES FOR DECARBONIZATION



24-40	H&C is expected to account for additional electricity requirements in a range between 2.5 TWh and 8 TWh in 2025, 4 TWh and 16 TWh in 2030, 7 TWh and 18 TWh in 2040, depending on the scenario considered.
30	Our assumptions lead to estimate 6.7 TWh of H&C consumption in 2030, corresponding to around 1.8 million installations for civil uses.
31-50	We assume a BAU trend in the long-term horizon, starting from the annual level of additional installations and consumption reached in 2030.
Main updates	H&C hypotheses are in line with the previous market update, that considers the outcomes of a survey conducted in recent years by REF-E among H&C installers.

5.2.3 Industrial Self-Production and Self-Consumption

INDUSTRIAL SELF-CONSUMPTION WILL GRADUALLY DECREASE AS EXISTING ASSETS REACH END-OF-LIFE AND THE EXEMPTIONS ACCORDED TO CLOSED DISTRIBUTION SYSTEMS WL BE AT LEAST PARTIALLY REMOVED



24

Law 91/2014 affirms that grid and general system tariff components should be applied to the electricity consumed and not only to the electricity withdrawn from the public grid. Following this approach, the exempons accorded to RIU (Re Interne di Utenza) and SEU (Sistemi Efficien di Utenza) and closed distribuon systems, and the benefits currently in force for exisng plants related to self-consumpon will be at least parally removed for new subjects/projects that apply for similar mechanisms.

25-50

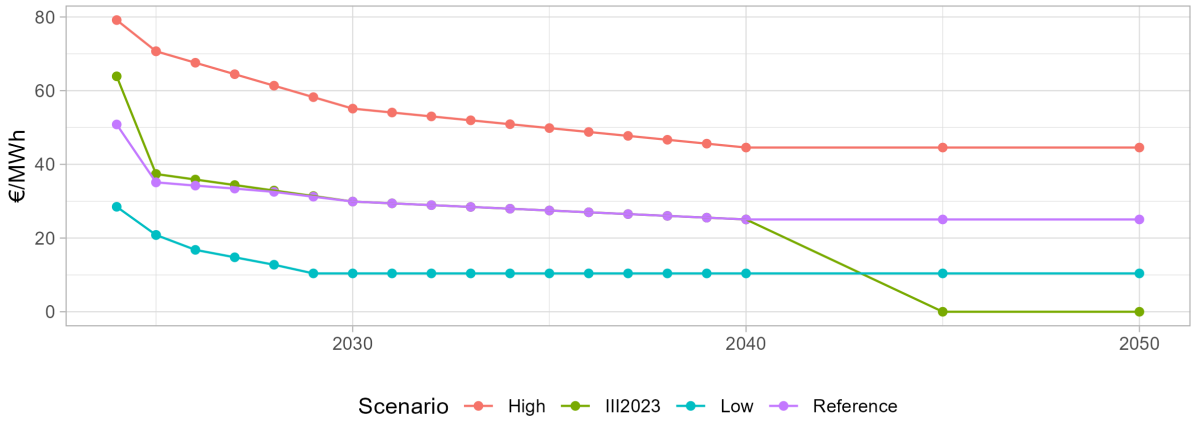
The excess of self-produced electricity that is not consumed by the industrial sites (self-consumpon) and is thus sold on the market (differenal between self-producon and self-consumpon) is expected to gradually decrease, consistently with the expected end-of-life of exisng power plants that serve industrial sites.

Main updates

Industrial self-producon and self-consumpon hypotheses have been updated considering the most recent historical data but are in line with the previous update. Self-producon/consumpon hypotheses are the same in all the three scenarios.

5.2.4 Zonal Distribution of Electricity Demand

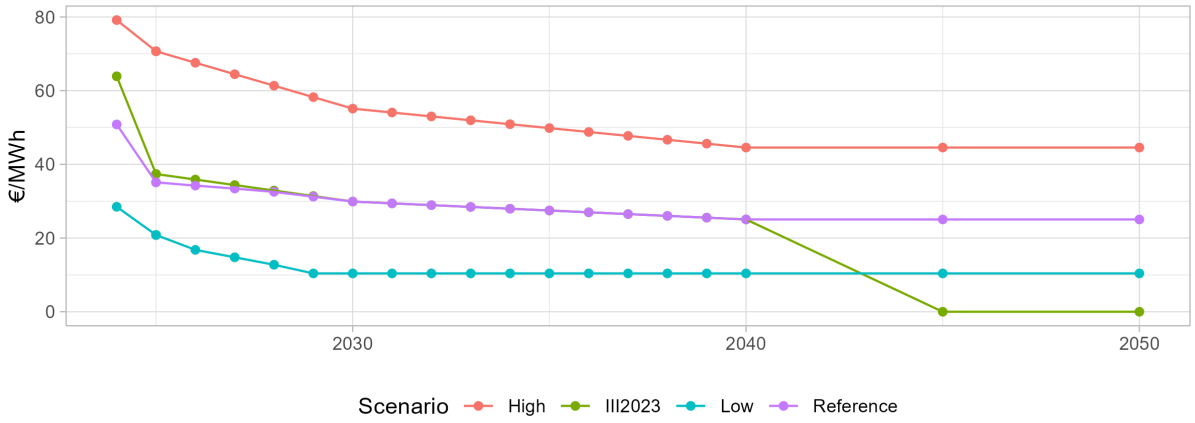
** ZONAL DISTRIBUTION OF ELECTRICITY DEMAND IS ESTIMATED IN LINE WITH MOST RECENT REGIONAL TRENDS **



15-20	In 2015, the approval of the European guidelines on capacity allocaon and congeson management (CACM) introduced new parameters to be followed in the zonal configuraon review process. In 2018, Terna began a process to review the zonal configuraons in compliance with such rules.
21-onwards	The current zonal configuraon derives from the base case proposed by Terna in compliance with the CACM. Differences compared to the previous configuraon: (i) eliminaon of the limited producon poles, (ii) inclusion of a new bidding zone corresponding to the Calabria region, (iii) displacement of the Umbria region from the Centre-North zone to the Centre-South market zone.
24-50	The zonal distribuon of electricity demand is based on historical regional data published by Terna and subsequent econometric elaboraons. In the Reference case, the zonal distribuon of electricityneeds is as follows: North (57%), Central-North (9%), Central-South (17%), South (7%), Calabria (2%), Sicily (6%), Sardinia (3%). Slight differences in such figures between the alternave cases are the result of the econometric elaboraons performed.
Main updates	The approach adopted and the distribuon quotas are in line with the previous update.

5.3 Net Import

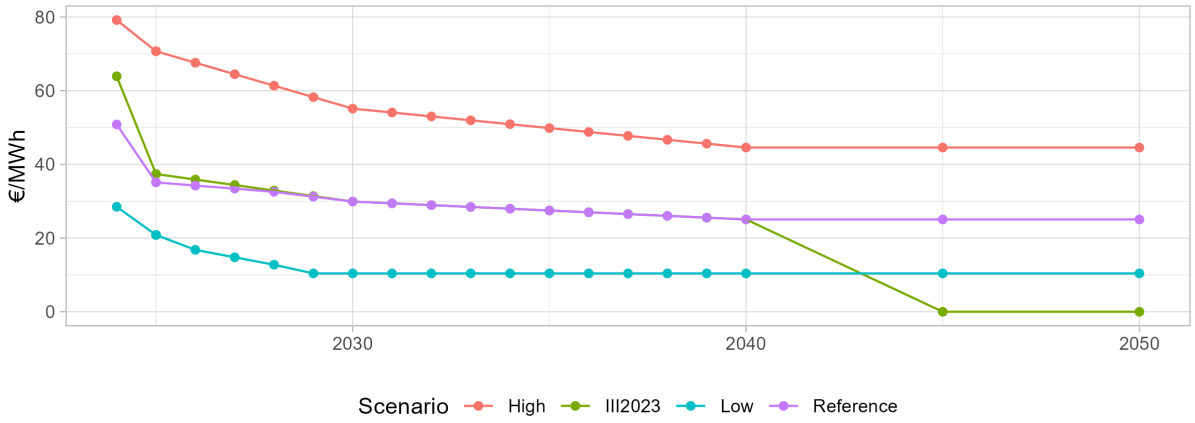
** NET IMPORT IS EXPECTED TO RANGE AROUND 40 TWh IN THE MEDIUM TERM DRIVEN BY SWITCHING DYNAMICS THAT SUSTAIN IMPORT FLOWS IN LINE WITH HISTORICAL LEVELS. IN THE LONG-TERM THE GRADUAL PHASE-OUT OF COAL- FIRED AND NUCLEAR CAPACITY IN CONTINENTAL EUROPE DRIVES THE REDUCTION OF IMPORTED ENERGY, ASSUMING A PARTIAL ACHIEVMENT OF 2030 TARGETS THROUGHOUT EUROPE **



24-25	In 2021 net import flows totalled around 43 TWh due to conngent condions and despite cricalies it reached 43 TWh also in 2022. In the next couple of years, turmoiled commodies market are expected to affect cross-border dynamics and net import flows are assumed stay close to 40 TWh, mainly because of sustained imported volumes from northern froners.
26-30	Net imports flows are assumed to slowly decrease in the second half of the decade to around 32 TWh in 2030. This is due to: (i) recovering switching condions and the paral dismission of the nuclear and coal- fired capacity in France and Germany – and considering also a BAU approach in esmang the achievement of 2030 renewable targets in other European countries; (ii) the go-live of the Tunisia-Sicily cable, that reduces the net import balance by adding more than 3.5 TWh of export flows .
31-50	The phase-out of nuclear and coal-fired units in connental Europe could lead to a further net import decrease in the 2030s, unl 13 TWh ca. in 2040. The slight increase in net import seen from 2035 is due to an esmated reducon (1 TWh ca.) in the export flows towards Tunisia, following the Tunisian system development plan. In the High scenario, net imports remain sustained as switching condions only parally improve and no significant nuclear/coal-fired dismission is supposed in connental Europe.
Main updates	Net import values line with the previous update and consistent with commodies levels and consequent switching dynamics. In the Low scenario, long-term net import values are assumed equivalent to the Reference case under the assumpon that naonal grid security condions must be ensured.

5.4 Capacity from 2024 Capacity Market Auction

** NEW PROJECTS CONCENTRATED IN THE NORTH ZONE AND SARDINIA, THOSE MANIFESTING THE GREATEST ADEQUACY NEEDS. ALL THE NEW GAS-FIRED PROJECTS PARTICIPATING TO THE AUCTIONS ARE SUPPOSED TO EXPLOIT THE 1-YEAR BUFFER PERMITTED BY THE RULES OF THE MECHANISM **

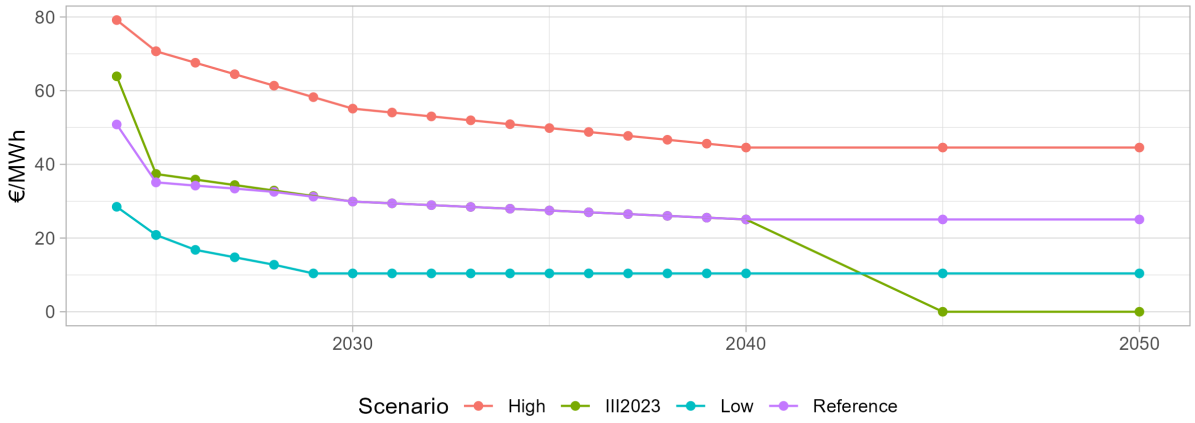


NORD, CNORD	1.7 GW of new high-efficiency gas-fired capacity and almost 0.6 of new electrochemical storage capacity have been procured in the North market zone, the one which will suffer the most – under a system adequacy point of view – from the dismission of coal-fired capacity. In the Centre-North market zone, about 50 MW of new storage capacity have been procured instead.
CSUD, SUD, CALA	These zones will be interested by the phase-out planned for 2025 as they respecvely host about 1.8 GW and 2.6 GW of coal-fired capacity. However, only 0.4 GW ca. between gas-fired and storage capacity have been awarded among the two – 0.3 GW in Centre-South and the remaining capacity in South – a□er the compeve procedure. No new projects were awarded in Calabria.
SICI, SARD	In Sardinia, coal-fired units will not be substuted by new gas-fired generaon as the 0.8 GW awarded only come from new storage capacity. This could be a cornerstone for the island as the transion path embraced would hence neglect natural gas and favor fully electrified soluons. In Sicily, the compeve procedure resulted in the procurement of just 12 MW of new storage capacity.
Main updates	2024 Capacity Market aucon outcomes are based on the data published by Terna and recent informaon regarding construcon time.

5.5 Thermoelectric Generation

5.5.1 Installed Capacity, Reference Scenario

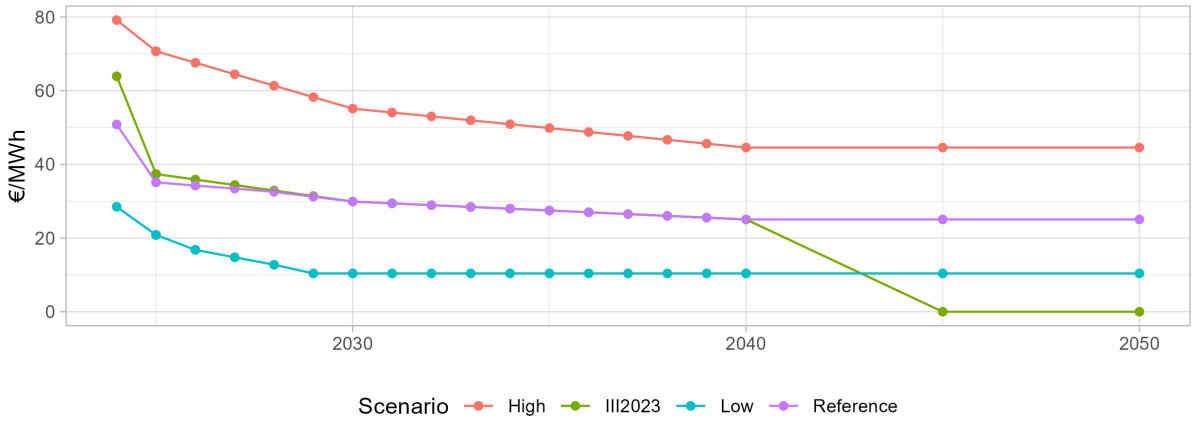
** CAPACITY MARKET AUCTIONS WILL COMPREHENSIVELY BRING 7.3 GW OF NEW GAS-FIRED CAPACITY ONLINE BETWEEN 2022 AND MID 2025. SARDINIAN COAL-FIRED UNITS TO BE PHASED-OUT ONLY IN 2030, IN CORRESPONDENCE OF THE COMPLETION OF THE TYRRHENIAN LINK INFRASTRUCTURE **



24-25	Due to troubles in compleng the perming process, some capacity procured through the 2022-2023 Capacity Market (CM) aucons will not be realized. According to the latest data published by Terna, the total amount of new gas-fired capacity supported by 2022-2023 CM premium should total around 5 GW.
26-30	The first results of the 2024 CM aucon show that around 1.8 GW of new gas-fired capacity has been procured and will enter the market between late 2024 and mid-2025. Aucon results show also that Sardinian coal-fired capacity will not be substuted by gas-fired units, as only storage capacity was awarded in the island. Anyway, while coal-fired plants on the peninsula will be phase-out a□er 2025, Sardinian units are expected to operate unl the Tyrrhenian Link infrastructure is fully completed (2030).
31-50	The amount of capacity auconed through the CM is expected to grant full system adequacy at least through to 2030. No other thermoelectric capacity investments are envisaged a□er the wave of investment brought by the last CM aucons. Exisng CHP power plants connue to support industrial acvies under the assumpon of a BAU evoluon of the industrial needs they serve. Some ageing CCGT capacity exit the market.
Main updates	Evoluon of new thermoelectric capacity reviewed consistently with latest informaon diffused by Terna with respect to the results of Capacity Market aucons. Hypotheses related to exisng gas-fired capacity are in line with the previous market update.

5.5.2 Installed Capacity, Low Case Scenario

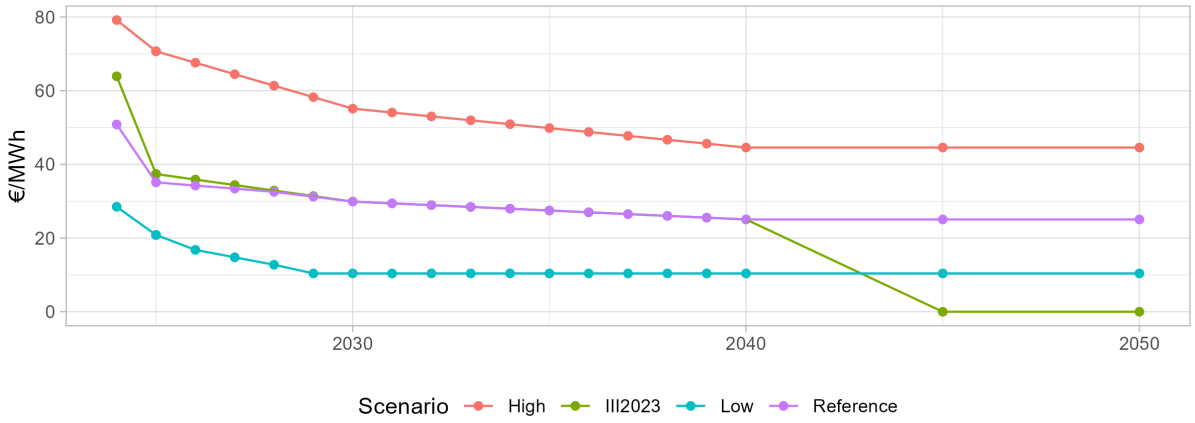
** CAPACITY MARKET AUCTIONS WILL COMPREHENSIVELY BRING 7.3 GW OF NEW GAS-FIRED CAPACITY ONLINE BETWEEN 2022 AND EARLY 2025. ALL COAL-FIRED UNITS PHASED-OUT IN 2029 UNDER THE HYPOTHESIS OF A QUICK REALIZATION OF THE TYRRHENIAN LINK INFRASTRUCTURE **



24-25	Due to troubles in compleng the perming process, some capacity procured through the 2022-2023 Capacity Market (CM) aucons will not be realized. According to the latest data published by Terna, the total amount of new gas-fired capacity supported by 2022-2023 CM premium should total around 5 GW.
26-30	The first results of the 2024 CM aucon show that around 1.8 GW of new gas-fired capacity has been procured and will enter the market between late 2024 and early 2025. Sardinian coal-fired plants are phase-out in 2025 together with power plants located in the peninsula under the hypothesis of a quick realizaon of the Tyrrhenian Link infrastructure.
31-50	No other thermoelectric capacity investments are envisaged a□er the wave of investment brought by the last CM aucons. Most of exisng CHP power plants gradually exit the market, substuted by greener soluons. Some ageing CCGT capacity exit the market following strong compeve condions.
Main updates	Evoluon of new thermoelectric capacity reviewed consistently with latest informaon diffused by Terna with respect to the results of Capacity Market aucons. All coal-fired units phased-out in 2029 under the hypothesis of a realizaon of the Tyrrhenian Link infrastructure in line with Terna assumpons. Hypotheses related to exisng gas-fired capacity are in line with the previous market update.

5.5.3 Installed Capacity, High Case Scenario

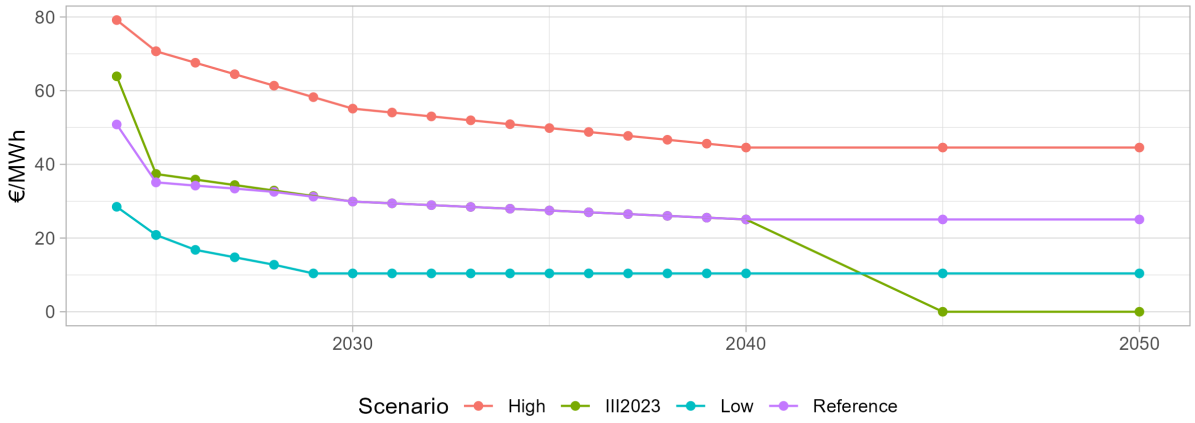
** CAPACITY MARKET AUCTIONS WILL COMPREHENSIVELY BRING 7.3 GW OF NEW GAS-FIRED CAPACITY ONLINE BETWEEN 2022 AND EARLY 2025. PHASE-OUT OF COAL-FIRED POSTPONED UNTILL 2035 WHEN TYRRHENIAN LINK BECOME OPERATIVE **



24-25	Due to troubles in compleng the perming process, some capacity procured through the 2022-2023 Capacity Market (CM) aucons will not be realized. According to the latest data published by Terna, the total amount of new gas-fired capacity supported by 2022-2023 CM premium should total around 5 GW.
26-30	The first results of the 2024 CM aucon show that around 1.8 GW of new gas-fired capacity has been procured and will enter the market between late 2024 and early 2025.
31-50	No other thermoelectric capacity investments are envisaged after the wave of investment brought by the last CM aucons. Exisng CHP and CCGT power plants are remain operave. Realizaon of the Tyrrhenian Link in 2035 determine the phase-out of all coal power plants.
Main updates	Evoluon of new thermoelectric capacity reviewed consistently with latest informaon diffused by Terna with respect to the results of Capacity Market aucons. Phase-out of coal-fired units postoned unl 2035. Hypotheses related to exisng gas-fired capacity are in line with the previous market update.

5.5.4 Residual Demand for CCGTs

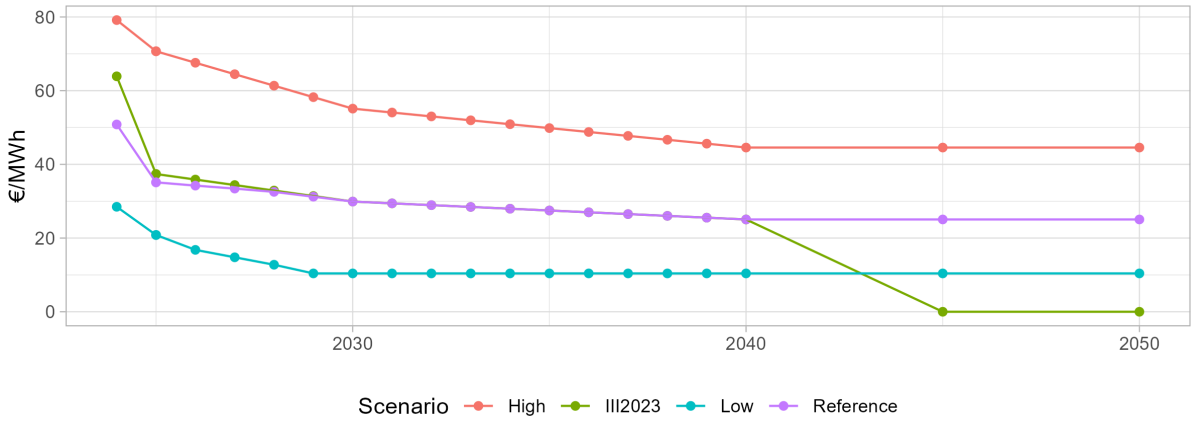
** EXISTING CCGTs COULD ACHIEVE ABOUT 3000 EOH IN THE SHORT-THERM AND RANGE BETWEEN 2000 AND 2500 EOH IN THE MID- AND LONG-TERM DUE TO THE GREATER DEGREE OF COMPETITION BROUGHT BY THE NEWBUILD CAPACITY AFTER 2024-2025 CAPACITY MARKET AUCTIONS **



24-25	Due to reversed coal-to-gas switching condions, the exisng CCGT fleet is supposed to average about 2200 EOH in the 2024-2025 period in the Reference case. In the alternave scenarios, the diverse results depend on the different switching condions: in the Low scenario, the 2024-2025 average is 2200 EOH, while in the High scenario the figure drops to 2000 EOH. In the same period, min-max performances of new, high-efficiency CCGTs range between 4000 EOH and 6300 EOH (considering the three cases).
26-30	A□er the phase-out of coal-fired units, the residual demand rebounds but exisng CCGTs suffer the compeon brought by sustained import levels and new high-efficiency competors entering with the Capacity Market support. In the Low scenario, residual demand is furtherly reduced by the energy efficiency effect on consumpons and the greater renewable penetraon. In the High scenario, the progressive increase of residual demand is due to improving switching condions.
31-50	Exisng CCGTs (53%-efficiency) stabilize around 2400 EOH. In the Low scenario, the great renewable penetraon influences compeve dynamics and exisng units remain close to 1600 EOH. In the High scenario, the improvement of switching condions is hampered by the high level of imports from abroad, with EOH of exisng units over 2000 favored by caol phase-out a□er 2035. High-efficiency units stabilize below the 4800 EOH only in the Low scenario.
Main updates	CCGTs producon varies in the scenarios according to the different hypotheses made for commodies, demand growth and the evoluon of the thermoelectric installed capacity.

5.5.5 Coal-fired Production

** REVERSED SWITCHING DYNAMICS AND MAXIMIZATION PROGRAM FOSTER COAL-FIRED PRODUCTION IN THE SHORT- TERM. IN THE MID-TERM CONTINUATION OF CURRENT DYNAMICS ONLY EXPECTED IN THE HIGH CASE, IN THE LONG- TERM THE ETS MECHANISM GENERATE AN ECONOMIC PHASE-OUT FOR COAL PLANTS **

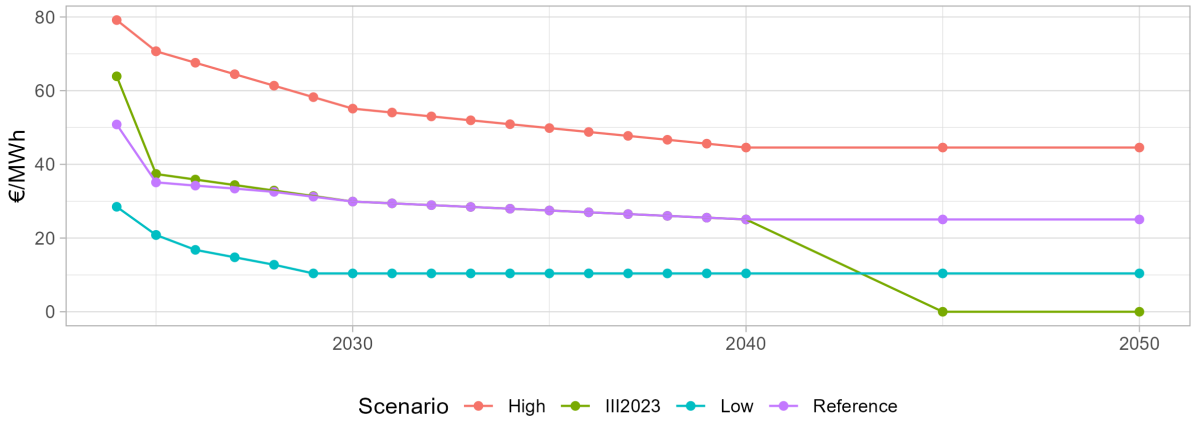


24-25	Starng from the end of 2021 coal-to-gas switching condions favoured a recovery of coal-fired producon. Measures implemented to reduce gas, such as coal power plants maximizaon program, are expected to guaranty high operavity of coal plants in the short term, with producon levels reaching 17 TWh in the Reference case and 18 TWh in the High scenario. In the Low scenario the quicker reasorbaon of commodies prices limits the recovery of coal-fired producon to a 12TWh.
26-30	Coal phase-out in the different scenarios depend on the funconality of the main grid infrastracture (Tyrrhenian link). In the Reference case only the units in Sardinia will connue to operate a□er 2025 unl the Tyrrhenian Link is completed in 2030. In the Low scenario all units will be phased out by 2025. However, in the High scenario coal-powered units may connue to operate unl 2035.
31-50	Coal units remain operave only in the High scenario unll phase-out in 2035, with the entrance of the Tyrrhenian Link, with favourable condions for coal switching price most of the units are going to be in an economical phase-out, only the most efficents remains operave.
Main updates	CCGTs producon varies in the scenarios according to the different hypotheses made for commodies, demand growth and the evoluon of the thermoelectric installed capacity.

5.6 Reneweable Generation

5.6.1 Renewable Installed Capacity

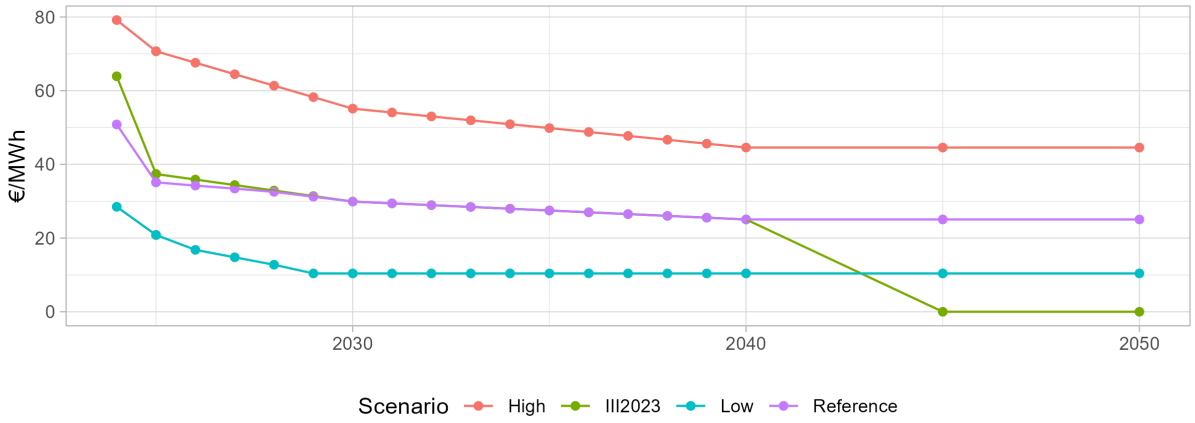
** RES MARKET PARITY CONSOLIDATES SUPPORTED BY THE SURGE IN COMMODITIES PRICES AND DECARBONIZATION TARGET. A POTENTIAL ACCELERATION IN RES INSTALLED CAPACITY COULD BE POSSIBLE FOLLOWING THE RECENT INSTALLATION TREND, IN PARTICULAR FOR SOLAR CAPACITY **



24-25	In the Reference case, the potenal for renewable development is considered based on recent trends, taking into account both bureaucrac and technical obstacles. This results in an esmated increase of 7.4 GW of solar and 2 GW of wind capacity. In Low scenario, there is a greater emphasis on achieving a decarbonized economy,with 10 GW of solar and 2 GW of wind power. High scenario, the growth of renewables is hindered by unfavourable economic condions, resulng in an increase of just 5.4 GW and 0.6 GW of new solar and wind capacity, respecvely, over the same two-year period.
26-30	Market parity condions will accelerate the progress towards achieving long-term targets. In the Reference case, there is an ambious plan for the development of renewables with an esmated 49 GW of solar and 16 GW of wind capacity by 2030, allowing to reach almost 50% of the energy demand. This scenario assumes a market-driven evoluon of the sector. Low scenario reach 63 GW of solar and 21 GW of wind capacity by 2030, development achieved through a faster decrease in technology costs.
31-50	The Reference scenario predicts a connued increase in renewables penetraon, with solar and wind capacity expected to reach 69 GW and 27.6 GW, respecvely, by 2040. However, an even faster transion towards achieving long-term decarbonizaon goals may be possible with the help of greater-than- ancipated investments in grid infrastructure and high-capacity energy storage soluons. These investments could enable an accelerated convergence towards meeng long-term decarbonizaon objecves.
Main updates	The assumpons regarding renewable capacity have been updated in line with the latest available data and consistently with the TSO connecon requests.

5.6.2 Renewable Production

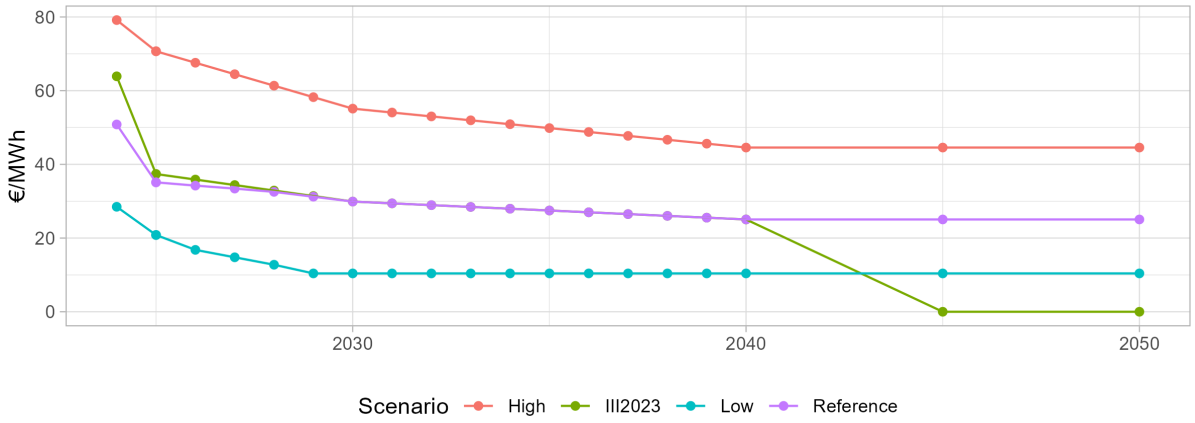
** THE ACHIEVEMENT OF THE NIECP TARGETS RELATED TO THE ELECTRICITY SECTOR REQUIRES A GREAT EFFORT: A 2030 RES/GDC RATIO OF 65% COULD BE ACHIEVED ONLY WITH A STRONG ACCELERATION OF PROJECTS RECEIVING THE GREEN LIGHT IN THE NEXT FEW YEARS **



24-25	In the next two years, solar and wind produco are assumed to reach past 35 TWh and 26 TWh by 2024. In the Low scenario, instead, the greater technological and praccal development of projects leads to reach past 41 TWh (solar) and 27 TWh (wind) in the same period.
26-30	Assuming a BAU evoluon of the market and the eliminaon of perming process constraints in the next future, an 90% quota of the 2030 RES/GDC rao target is expected to be achieved. Only a greener evoluon of the Italian system is expected to be able to lead to the full achievement of the target (55+ %). The achievement of Green Deal targets – possibly RES/GDC around 70%, yet to be defined – would surely require a greater effort instead.
31-50	The reducon of technology costs and consolidated market parity condions could allow solar producon to almost quadruple and wind generaon to more than triple with respect to 2022 values in 2040 in the Reference scenario. Boundary condions of alternave scenarios lead to different degrees of renewable development and producon level.
Main updates	RES producon are in line with capacity installaon and technology performance.

5.6.3 Day-Ahead Market Overgeneration

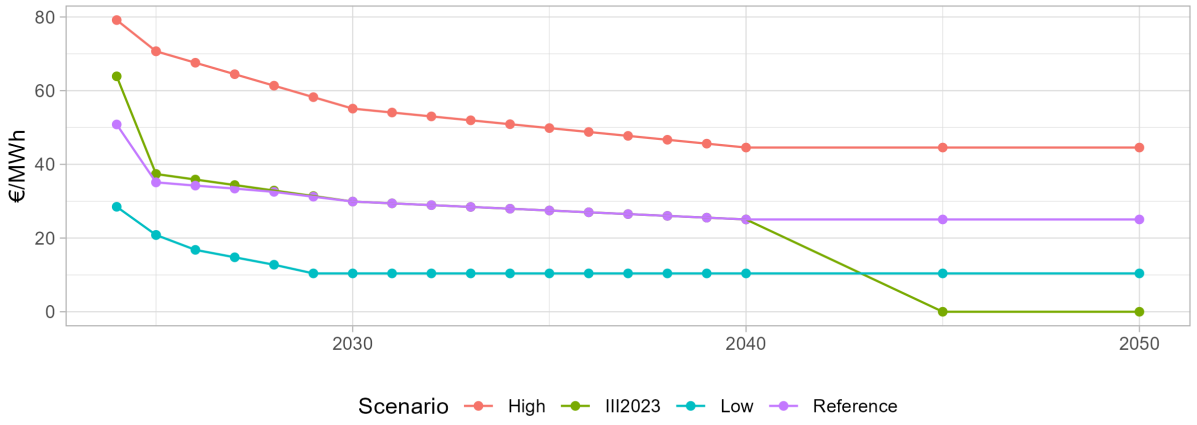
** OVERGENERATION COULD BECOME SIGNIFICANT IN THE LONG-TERM, FOLLOWING THE HIGH RENEWABLE PENETRATION IN THE ENERGY MIX, IN PARTICULAR IN THE SOUTHERN ZONES. THE DEVELOPMENT OF ENERGY INTENSIVE STORAGES AND ELECTROLYSIS CAPACITY COULD MITIGATE THE MARKET COUNTEREFFECTS **



24-25	BAU market condions and moderate renewable penetraon lead to a minimum risk of overgeneraon in Reference and High scenario, while a more sustained increase in capacity installaon in the south macro- zone could lead to overgeneraon in some hours.
26-30	Greater penetraon of renewable energy sources expected a□er 2026, there is a possibility of overgeneraon starng to increase, which could result in more than 3 TWh of excess electricity in the Low scenario by 2030. The curtailment effect may be emphasized in certain local grid condions. Moreover, during this decade, overgeneraon is likely to be exacerbated by the rapid development of renewable energy sources in the southern regions of the country and the lack of adequate grid reinforcement.
31-50	In order to effecvely manage the growing penetraon of renewable energy sources and the associated overgeneraon phenomena, the 2030s will require significant investments in grid reinforcements and high- capacity energy storage soluons. These measures will be crucial for balancing the grid and ensuring stable energy supply, especially in regions that are parcularly prone to overgeneraon. This excess energy producon could provide opportunies for the installaon of electrolysis capacity, which would not only help to take advantage of excess energy producon but also support ongoing investments in RES
Main updates	Day-ahead market overgeneraon updated according to new scenario hypothesis concerning RES installaon and grid reinforcement.

5.6.4 Electrolyzer Installed Capacity

** LONG-TERM RENEWABLE GROWTH IN SOUTHERN REGIONS WILL CAUSE EXCESS ENERGY, ESPECIALLY ON ISLANDS. GRID AND BESS DEVELOPMENT MAY NOT BE SUFFICIENT TO CONTAIN THE PHENOMENA, ELECTROLYSER MAY BE NEEDED. INSTALLED CAPACITY COULD REACH 0.5 GW IN REFERENCE AND 4 GW IN LOW SCENARIO, MAINLY IN SARDINIA AND SICILY **



35-40

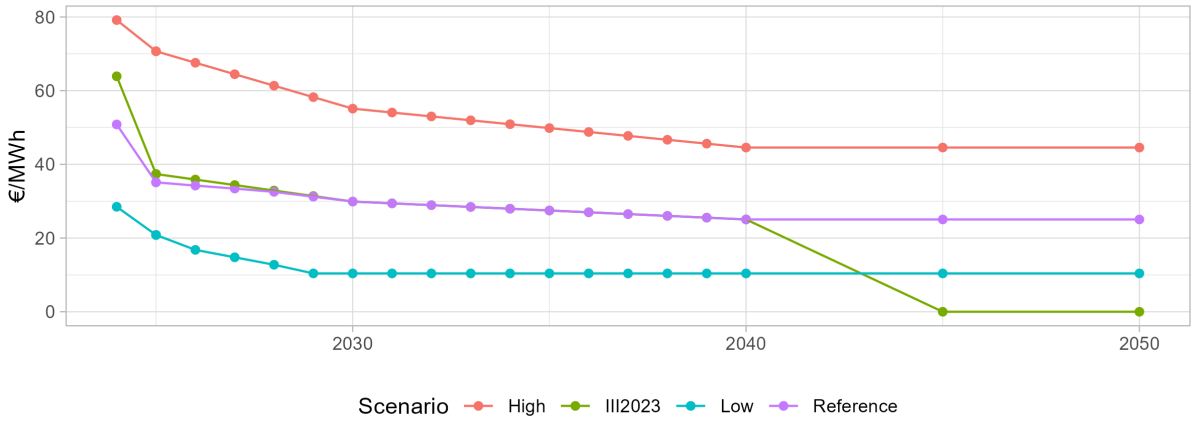
In the long-term the development of renewable capacity, in parcular in the southern zones, increase the presence of systemac overgeneraon in the system, mainly in the islands. Grid investments and BESS are going to be insufficient to migate the problem, creang favourable condions for green hydrogen, installed electrolysis capacity could reach almost 0.5 GW in the Reference scenario, concetrated in Sardinia. In the long-term, electrolysis capacity can effecvely address overgeneraon by providing a means to store excess renewable energy. Addionally, by increasing demand during periods of high RES producon, it can help sustain prices and migate the cannibalizaon effect, parcularly during the advanced transion phase.

Main updates

Electrolysis capacity introduce in Reference and Low case scenario, considering Day-ahead market overgeneraon update according to new scenario hypothesis concerning RES installaon and grid reinforcement. Expected load factor at least between 1700 and 2000 equivalent hours. Commodies prices make green hydrogen compeve compared to grey.

5.6.5 Solar Market Parity

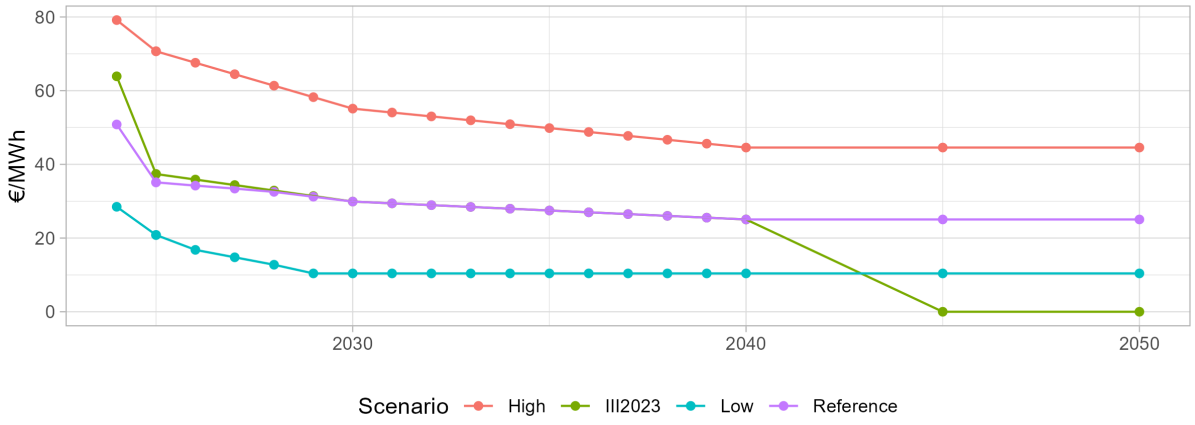
** THE RISE OF COMMODITIES DRIVES UP MARKET PRICES AND STRENGTHENS SOLAR MARKET PARITY IN THE NEAR FUTURE, DESPITE TECHNOLOGY COSTS ON THE RISE **



24-25	Despite some increase in technology costs, the solar energy sector connues to achieve market parity due to sll high in commodity prices, which are reflected in market prices. As baseload prices are expected to sele above 120€/MWh during the 2024-2025 period, solar power plants are projected to capture rates that are significantly higher than the esmated levelized cost of electricity (LCOE) across all scenarios. This indicates a posive outlook for the solar energy industry, which is likely to remain compeve and profitable in the near future.
26-30	Despite the potenal cannibalizaon effect on unlevered projects located in southern regions, market opportunies for merchant investments are expected to strengthen in the coming years.
31-50	The long-term outlook from 2030 onwards appears promising for the renewable energy sector, as the ongoing reducon in technology costs and the adopon of improved PPA best pracces are expected to support non-incenvized investments. However, the cannibalizaon effect could become a significant factor in certain regions, such as Sardinia and Sicily, where the grid infrastructure may not be capable of efficiently redirecng energy flows.
Main updates	Captured prices driven by the commodies prices dynamics. No development of tracker technology assumed in the High scenario unl 2040. LCOE metrics: 30-year me horizon, full equity financing, discount factor 7%.

5.6.6 Wind Market Parity

** THE RISE OF COMMODITIES DRIVES UP MARKET PRICES AND STRENGTHENS WIND MARKET PARITY IN THE NEAR FUTURE, DESPITE TECHNOLOGY COSTS ON THE RISE **



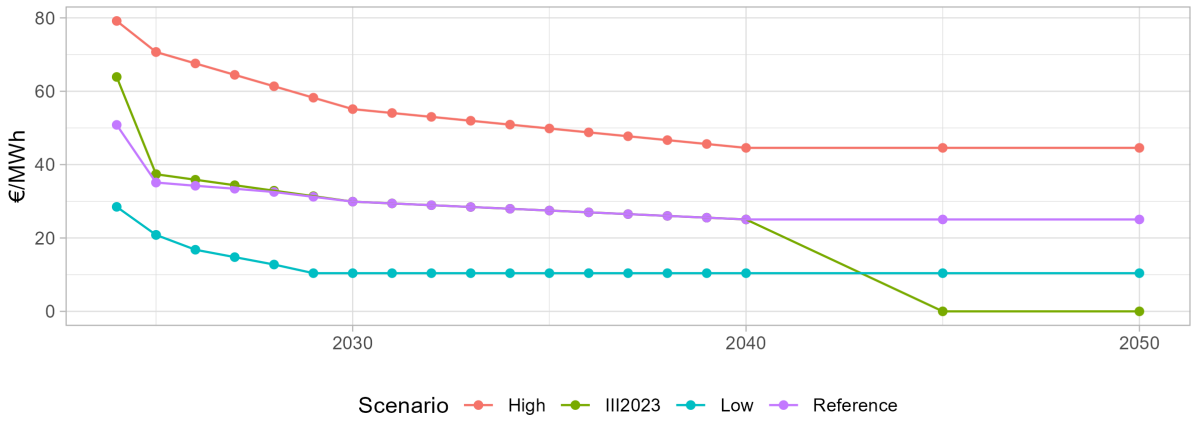
24-25	Wind market parity consolidates despite some increase in technology costs benefing from the bullish trend of commodies that influence market prices. With yearly captured prices aligned to baseload prices, wind power plants are expected to achieve promising results, above the esmated levelized cost of electricity (LCOE) in all the scenarios.

26-30	Market opportunies for merchant investments are expected to consolidate, as wind assets do not suffer from cannibalizaon effects. Site-specific maers may however influence project economics.
31-50	Long-term perspecves from 2030 onwards are promising, following the connuous reducon of the cost of technologies and improved PPA best pracces to support non-incenvized investments.
Main updates	Captured prices driven by the great surge in commodies prices. LCOE metrics: 30-year me horizon, full equity financing, discount factor 7%.

5.7 Storage

5.7.1 Pumped Hydro Production

** DAY-AHEAD MARKET OPPORTUNITIES FOR PUMPED HYDRO POWER PLANTS CAN ARISE IN THE SHORT-TERM BECAUSE OF THE EFFECT OF VOLATILE PRICES, WILL MANIFEST IN THE LONG-TERM BECAUSE OF THE CONTINUOUS INCREASE OF NON-PROGRAMMABLE RENEWABLE PRODUCTION **

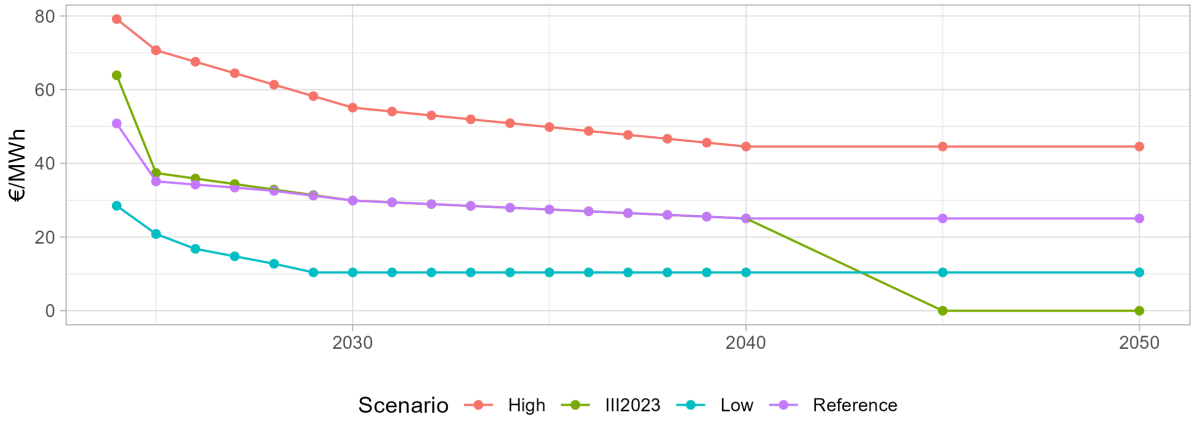


24-25	Within-day price spreads on the DAM could disclose opportunies for pumped hydro units, although the Ancillary Services Market (especially the real-me balancing phase) is expected to connue to be their main source of revenues.
26-30	Renewables development gradually increases the opportunies on the DAM. An accelerated development compared to the expected BAU trajectory could lead pumped hydro producon volumes to reach 3.5 TWh in the Low scenario.

31-50	With a penetraon of non-programmable renewable sources above 50% of total electricity needs, market opportunies furtherly increase: pumped hydro units help migate the solar cannibalizaon effect and help contain network congesons.
Main updates	Pure pumped hydro capacity currently amounts to about 4 GW and is not assumed to increase further in the future.

5.7.2 Power Intensive Electrochemical Storage

** POWER INTENSIVE ELECTROCHEMICAL STORAGES CAN BE IN THE MONEY IN THE MID-TERM: REVENUES DERIVE MAINLY FROM ANCILLARY SERVICES MARKET PARTICIPATION AND SPECIFIC SERVICES SUPPLY, AND COULD BE FURTHERLY SUSTAINED BY THE CHANGES BROUGHT BY THE FUTURE MARKET DESIGN REFORM. IN THE LONG RUN INCREASE IN RES QUOTA AND MORE VOLATILE PRICES FAVOR CONVERSION TO ENERGY INTENSIVE STORAGE **

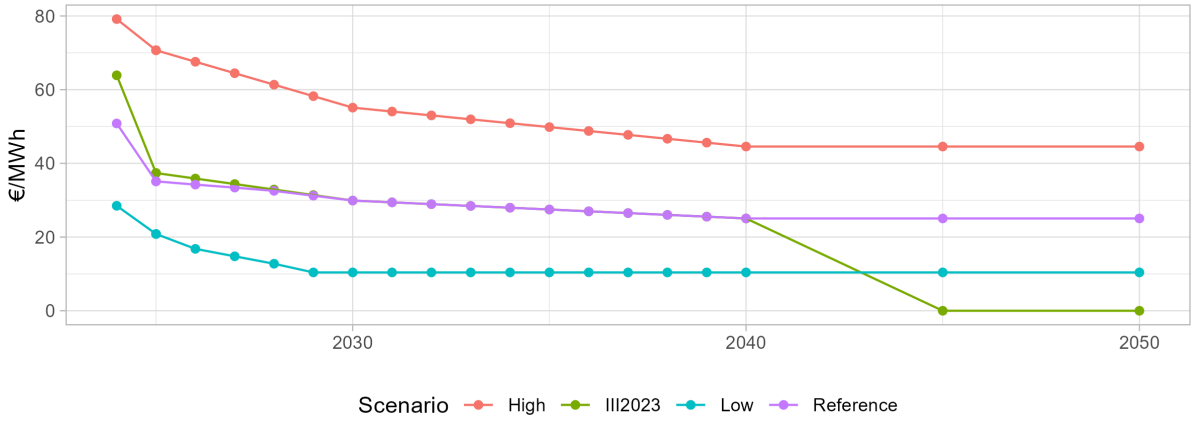


24-25	The first BESS (Baery Energy Storage System) projects are expected to come online in 2023 following the results of the Fast Reserve aucons held in December 2020. The pilot project proposed by Terna is based on the supply of a specific ultra-fast frequency regulaon service paid with a fixed yearly capacity remuneraon and is the first experience of development electrochemical storages in the italian market.
26-30	PI storages (1 hour of storage capacity) penetraon is sustained by growing needs on the BM as non- programmable renewable capacity progressively increases, in the first years. A□er reaching the peak in the mid 20s, power intensive gradually contract, due to opportunies for converng their units in energy intensive storage to capture the increase volale dynamics on DAM. Increased overgeneraon and contracion in ASM volumes reduce determine a gradual end in PI investments

31-50	Power intensive BESS capacity gradually disappear in the Reference and High scenario, progressively replaced by energy intensive BESS as they reach the end of the operaonal life, and remain available only in the Low scenario where higher RES capacity generate operavity signals on the ancillary service market.
Main updates	Power intensive storage updated taking in account ASM volumes dynamics and economic convenience.

5.7.3 Energy Intensive Electrochemical Storage

** 2024 CAPACITY MARKET AUCTION STARTED THE DEVELOPMENT OF ENERGY INTENSIVE STORAGES IN THE ITALIAN MARKET. LONG-TERM DEVELOPMENT OF SUCH KIND OF ASSET WILL BE KEY IN FOSTERING THE INTEGRATION OF RENEWABLES IN THE SYSTEM, WHEN THE GREAT SOLAR PENETRATION CREATES OPPORTUNITIES FOR TIME-SHIFTING APPLICATIONS ON THE DAY-AHEAD MARKET **



24	2024 Capacity Market aucon started the development of energy intensive storages in the Italian market, with more than 1.5 GW of new storage capacity – quite completely energy intensive (4 hours) – expected to hit the market by 2024 (possibly with some delays due to issue on the supply chain), with Sardinia and North to host about 0.8 GW and about 0.6 GW respecvely.
25-30	The Day-Ahead Market presents promising market opportunies for merchant energy-intensive storage applicaons with a storage capacity of 4 hours. This is due to the increasing price spread volality and the presence of overgeneraon resulng from the development of renewable energy sources. Addionally, the gradual decrease in technology costs further enhances the aracveness of energy-intensive investments.
31-50	Energy intensive applicaons reach an overall installed capacity of 22 GW in 2040. The larger installed capacity achieved in the Low scenario (near 31 GW in 2040) is consequence of greater

opportunies both on the DAM and on the ASM.

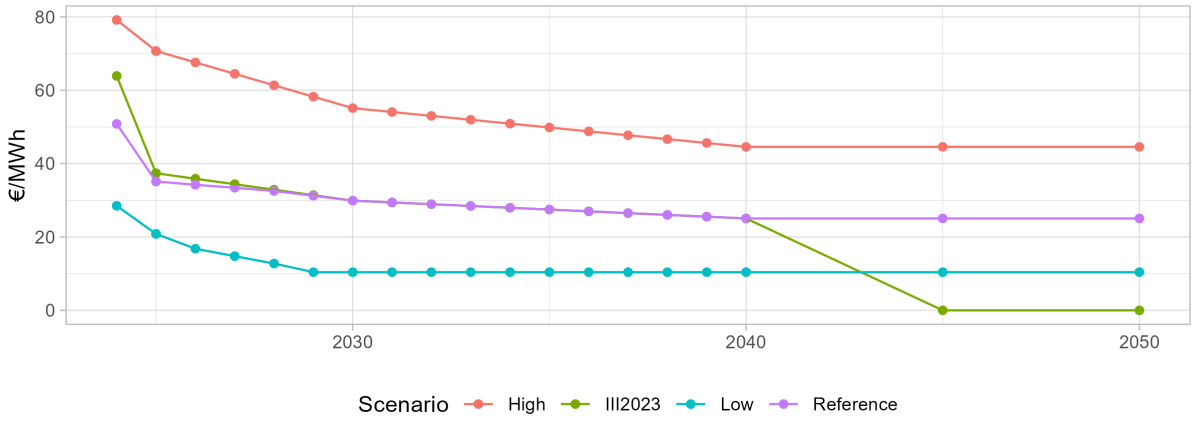
Main updates

Energyintensive storage updated taking in account overgeneraon dynamics and price volality on the DAM.

6 Transmission Grid

6.1 Grid Reiforcements

** IMPORTANT GRID REINFORCEMENTS TO BE REALIZED ALREADY IN THE 2020s BUT MAJOR IMPROVEMENTS ARE EXPECTED TO BE COMPLETED IN THE 2030s – TYRRHENIAN LINK AND ADRIATIC LINK. GREAT RES DEVELOPMENT GENERATE SIGNAL FOR FURTHER GRID REINFORCEMNTS AS INTER-ZONAL CONSTRAINT ARE NOT FULLY OVERCOM **



24-25

In all the scenarios proposed, network constraints are aligned with the most recent indicaons provided by Terna.

26-30

In the 2020s, some grid reinforcements are expected to improve the management of grid flows and reduce inter-zonal congesons in the mainland. Two main HVDC infrastructures are expected to come online in 2030: the two branches of the Tyrrhenian Link (key enabler of the phase-out of Sardinian coal-fired units) and the Adriac Link (that would help reduce bolenecks between southern and northern regions). The two infrastructures are introduced in the scenario with some years of delay with respect to the current meline proposed by Terna and ARERA. In the Low scenario, the two infrastructures are assumed to be realized in 2028. In the High scenario, these infrastructures enter only in 2035.

31-50

Under BAU assumpon, a further progressive reducon of inter-zonal constraints in the mainland is assumed to take place since 2035. In the Low scenario we assume the implementaon of the infrastructure proposed by Terna for the Hypergird project to reach 30GW of exchange capacity between market zones. In the High scenario the long-term network development is much more limited instead.

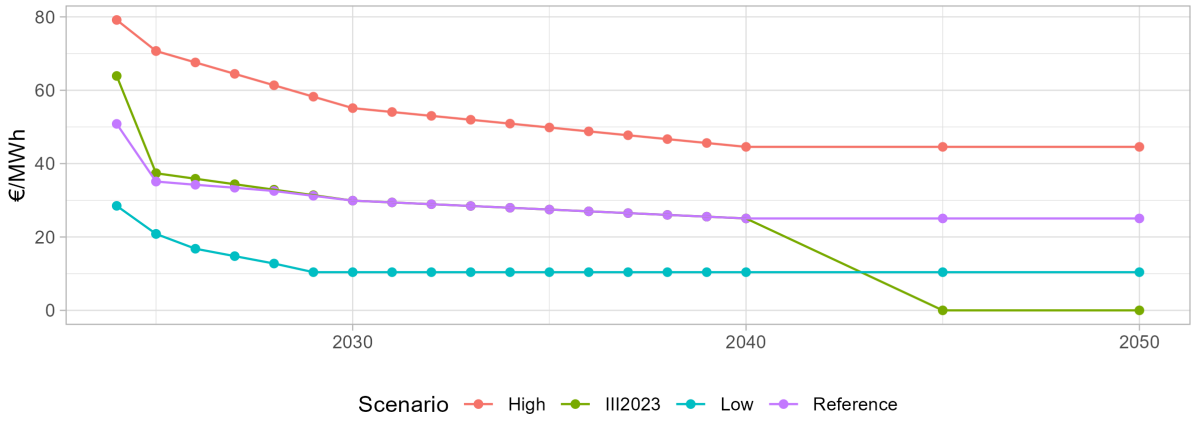
Main updates

BAU grid development hypotheses based on the latest Development Plan published by Terna (2023) and on informaon publicly available concerning the feasibility of the various network improvements. Assumpons in the alternave scenarios are consistent with other boundary condions.

7 Power Market Prices

7.1 Baseload PUN

** THE POWER MARKET IN THE SHORT-TERM WILL BE GUIDED BY RECOVERED BUT STILL HIGH COMMODITIES PRICES. A GRADULA NORMALIZATION OF PRICES IS EXPECTED IN THE MID-TERM. IN THE LONG-TERM, PRICES WILL BE MAILNLY DRIVEN BY CO2 MOVEMENTS, WHILE OTHER COMMODITIES ARE EXPECTED TO REACH A STABLE EQUILIBRIUM **



24-25

In the Reference scenario markets dynamics are expected to parally relax in 2024 as gas market gradually stabilze and hydro generaon recover. Bullish trend of gas market fundamentals, driven by the inventory cycle and increasing expected procurement compeon arising from Asia foster the li□ing in price. Consequently, the PUN yearly average moves towards 151 €/MWh, also supported by recovering electricity demand.

26-30

In the laer half of the 2020s, a gradual decline in commodies prices is expected due to the recovery of gas supply and economic growth. This decline, along with the increased development of RES, adopon of BESS technologies, and compleon of crucial network infrastructure, is projected to bring prices below 110 €/MWh in the Reference case. A stronger focus on system decarbonizaon could even drive prices down to 70 €/MWh in the Low scenario. However, in the High case, energy prices are expected to remain above 140€/MWh unl 2029.

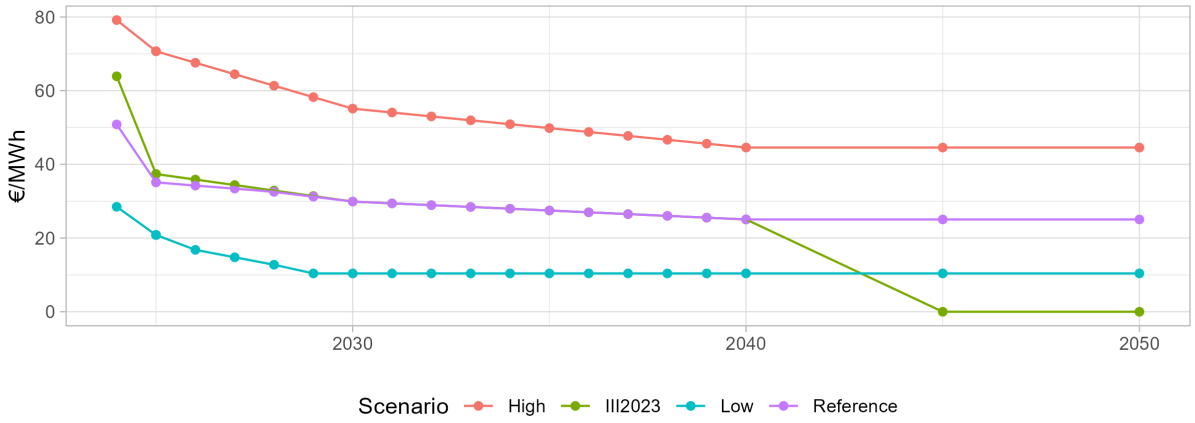
31-50

In the long run, power prices are expected to be supported by ETS dynamics, with CCGTs being the marginal technology in the system for at least 85% of the me, causing the baseload PUN to largely reflect their average variable producon costs. Depending on the level of decarbonizaon achieved in each scenario, the projected PUN range for 2040 is between 130-75 €/MWh.

Main updates	Compared to the previous update, the downward revision of commodies prices determines reducon in power prices during the 2020s. Long-term price trends are in line with previous update.

7.1.1 Peak-Load/ Off-Peak PUN

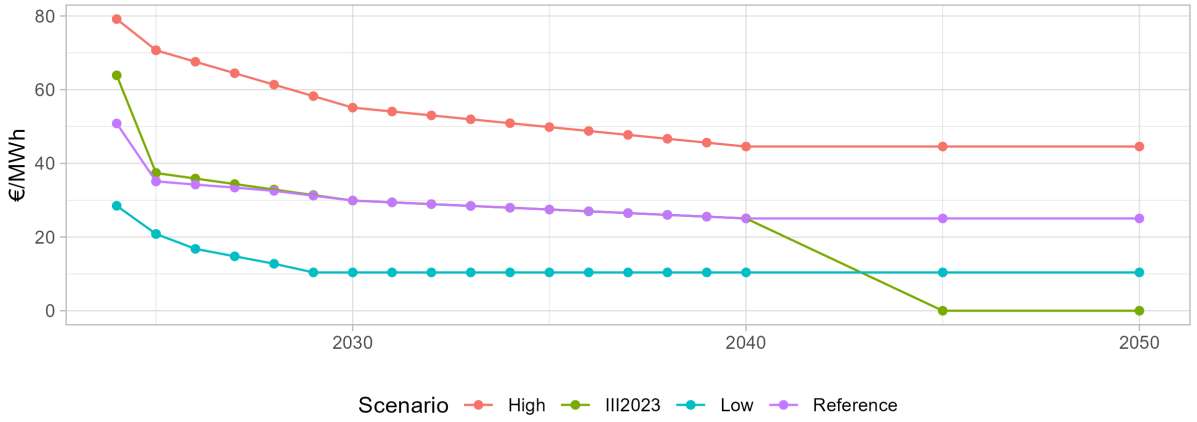
** RENEWABLES PENETRATION, LED BY SOLAR ENERGY, IS EXPECTED TO STRONGLY AFFECT PEAK / OFF-PEAK DYNAMICS AFTER 2030, WHEN THE INVERSION OF PRICE SPREADS BETWEEN TIME SLOTS IS EXPECTED TO OCCUR **



24-25	The posive price spread between evening and central hours of the day is expected to persist in the short- term, as renewables penetraon remains under 40% of gross domesc consumpons.
26-30	Sustained solar development will sharpen the price decrease in the central hours of the day, especially in correspondence of large sunlight availability and low demand levels (e.g., during spring), gradually closing the gap between peak and off-peak prices.
31-50	The reverse trajectory of hourly price differenals is expected to connue in the long-term, favoring the increase of prices in off-peak hours. The growing penetraon of energy intensive electrochemical BESS and the generally greater operavity of storage units could dampen the cannibalizaon effect produced by non- programmable solar power plants.
Main updates	The evoluon of the price for the different categories of hours is in line with the previous market update.

7.1.2 Baseload PUN Components, Reference Scenario

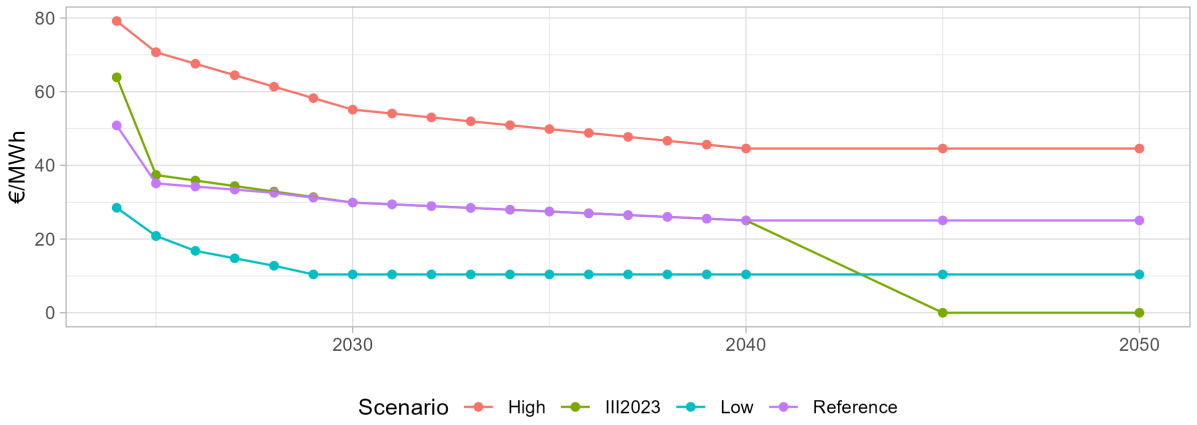
** CONTRACTION IN ELECTRICITY DEMAND AND RECOVER IN HYDRO GENERATION REDUCE CSS FOR EXISTING CCGTs IN THE SHORT-TERM. AFTER THE PHASE-OUT OF COAL-FIRED UNITS, THE CCS IS EXPECTED TO REMAIN CLOSE TO NULL, AS THE GROWING PENETRATION OF RENEWABLES AND THE CM-SUPPORTED NEWBUILDS AFFECT COMPETITIVE DYNAMICS **



24-25	High commodies prices connue to keep PUN elevated in the short-term and impact the equilibrium in the thermoelectric sector, parcularly gas-fired units. The significant rise in gas prices affects the variable costs of exisng CCGTs (the marginal technology in the Italian system), furthermore recovered of hydro generaon and presence of coal units in the mix determine a CSS below zero.
26-30	In the second half of the 2020s, it is expected that exisng CCGTs (Combined Cycle Gas Turbines) will benefit from the phase-out of coal-fired units in the peninsula and the growing demand, resulng in a baseload CSS (Clean Spark Spread) averaging around -2 €/MWh. However, this benefit will be challenged by factors such as the slowly decreasing trend of imported flows, intra-sectoral compeon from CM- supported newbuilds, and the growing trend of renewables.
31-50	In the long-term, renewables are expected to dominate the generaon mix. However, due to the decreasing trend of imported flows and increase in demand, exisng CCGTs are favored and are expected to remain the marginal technology in the system for at least 85% of the hours. This will result in the baseload CSS stabilizing near -1 €/MWh.
Main updates	Updated commodies hypotheses are the main driver of downward price variaons in the short- and mid- term, compared to the previous scenario. Long-term price trends are in line with previous update

7.1.3 PUN Hourly Storage

** INCREASING SOLAR PENETRATION SIGNIFICANTLY IMPACTS PRICES DURING CENTRAL HOURS OF THE DAY AND EXACERBATES DAILY PRICE DIFFERENTIALS IN THE LONG-TERM. THE EFFECT IS PARTIALLY MITIGATED BY THE DEVELOPMENT OF STORAGE UNITS **

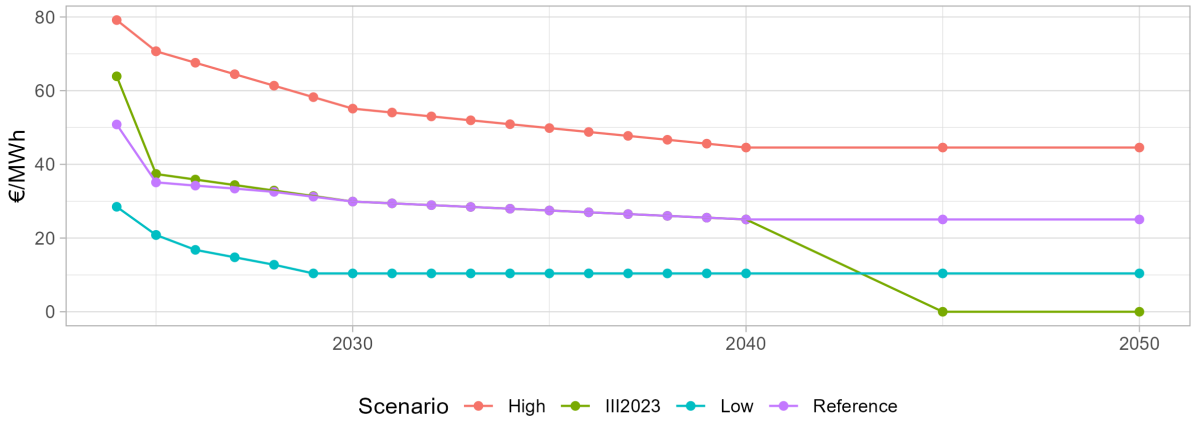


24-25	The effect of solar producon during central hours of the day is sll moderate as penetraon remains limited. Price differenals during the day aain current average levels.
26-30	As solar penetraon increases and the cannibalisaon effect intensifies, the spread between central and morning/evening peak hours increase. The development of single-axis tracker installaons, grid reinforcements, and power intensive storages only parally contain such effect.
31-50	As within-day price differenal and the number of hours in which prices reach 0 €/MWh increase, supporng investments in electrolysis capacity, me-shi□ing applicaons on the DAM become interesng and trigger new investments in energy intensive storage units.
Main updates	The PUN hourly shape is in line with the results of the previous update. Lower short- and mid-term absolute values incorporate the effects of updated commodies assumptions.

7.2 Baseload Zonal Prices

** IN THE SHORT-TERM, ZONAL PRICES ARE EXPECTED TO DIVERGE AS COAL PRODUCTION BECOMES MORE COST- EFFECTIVE IN CERTAIN AREAS. HOWEVER, OVER TIME, THE STRONG DEVELOPMENT OF RENEWABLE

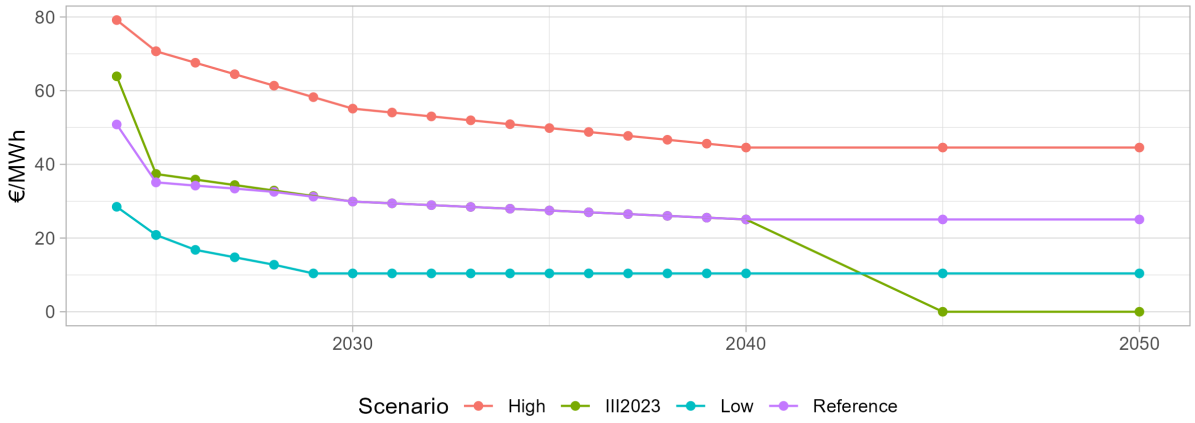
ENERGY SOURCES IN THE SOUTHERN MACRO-ZONE IS EXPECTED TO REDUCE PRICES DUE TO THE CANNIBALIZATION OF SOLAR TECHNOLOGIES **



24-25	Network congesons are generally not a major issue on the mainland. Eletricity demand sll belowe historical level and gradual growth of renewable generaon result in lower prices in the southern regions, while higher CCGT operaons in the northern zones lead to higher than PUN prices, consistent with recent historical trends.
26-30	Renewable penetraon will increase the number of inter-zonal congesons unl 2030, when the compleon of the Adriac Link is expected to parally contain the effect in the mainland and improve south-to-north energy exchanges. Even if a greater development of renewable energy sources in the southern zones is expected to gradualy increase congeson occurence, favouring prices separaon.
31-50	Despite the realized grid improvements, bolenecks are expected to occur anyway between northern and southern zones, leading to different price levels between them in 2030s. Further grid reinforcements are assumed from 2035, with consequent minimizaon of inter-zonal congeson issues on the mainland, while cricalies remain evident in the islands.
Main updates	The dynamics of zonal prices are in line with the previous update.

7.3 Evolution of Baseload PUN-South Price Differential

** THE EVOLUTION TREND OF THE SPREAD BETWEEN THE PUN PRICE – BASICALLY DRIVEN BY THE RESULTS OF THE NORTH MARKET ZONE – AND THE PRICE OF SOUTHERN MARKET ZONES STRONGLY DEPENDS ON THE ASSUMPTIONS RELATED TO RENEWABLES PENETRATION, STORAGE DEVELOPMENT, AND THE TIMING OF REALIZATION OF GRID INFRASTRUCTURES **

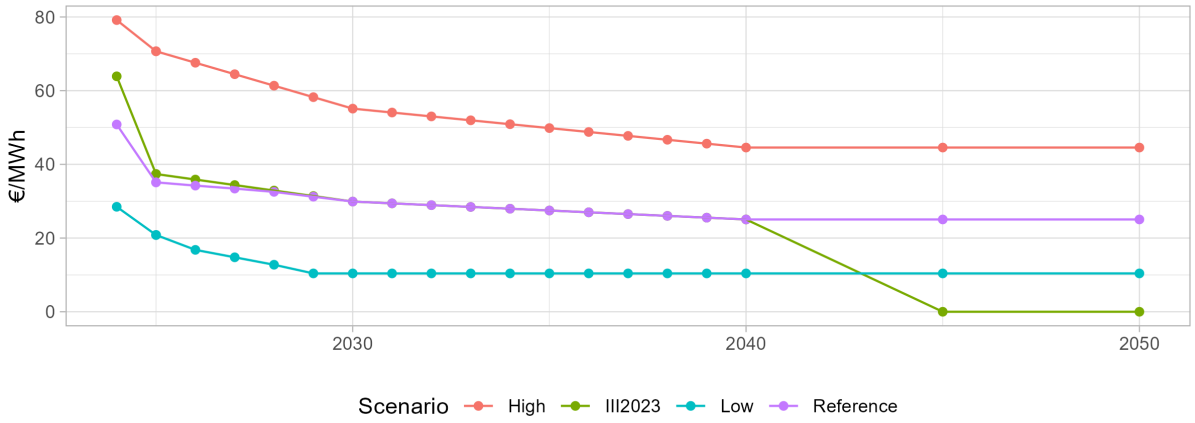


24-25	The spread between the PUN and southern market zones (here represented by the South zone) is expected to aain recent historical levels in the short-term, driven by operavity of coal units located in southern regions that, combined with a decreasing demand, results in CCGTs to become less determinant in establishing the zonal market price in those areas.
26-30	In the Reference case the phase-out of coal-fired units reduce the spread in the second half of the 2020s. In the Low scenario, instead, a greater renewables development contributes to further widen the spread, notwithstanding network intervenons. In the High scenario, the spread is reabsorbed as switching condions for gas-fired units gradually improve unl in 2030, when coal generaon become less compeve compared to gas.
31-50	In the Reference case, the great penetraon of renewables in southern regions widens back the spread in the first half of the 2030s, providing the market signal for new electrochemical BESS to enter the market and for new grid investment to be realized. In the Low scenario, the ancipated and greater development of storage and network investments helps reduce the spread instead. Connuos RES development widen again the spread in the second half of the 2030s.
Main updates	The evoluon of the spread between the PUN and southern zonal prices depends on the assumpons related to renewables, storage, and grid developments.

7.4 Clean Spark Spread

7.4.1 Baseload CSS for Existing CCGT Units

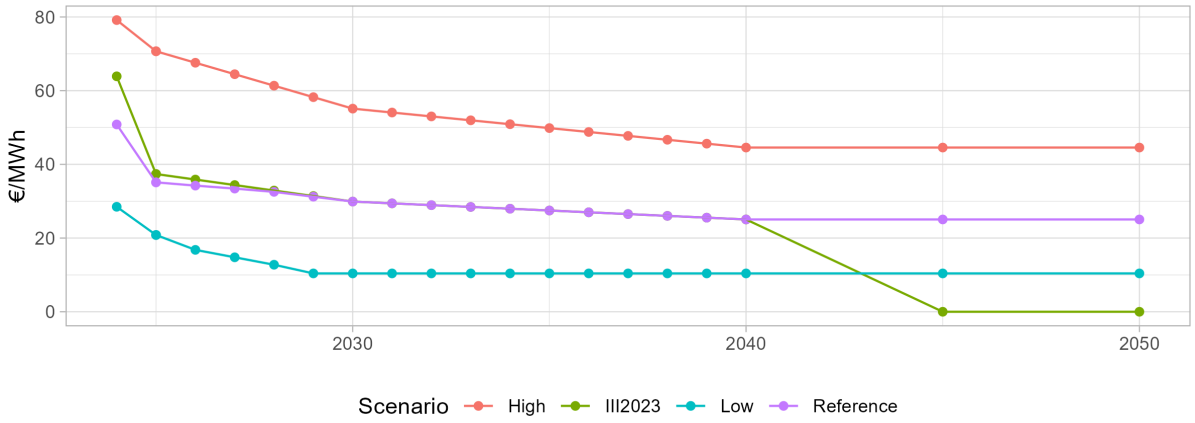
** BASELOAD CSS EXPECTED TO DECREASE IN THE SHORT-TERM FOLLOWING REVERSED SWITCHING DYNAMICS AND RECOVER IN HYDRO PRODUCTION. REFERENCE MID-TERM AND LONG-TERM VALUES EXPECTED TO STABILIZE IN THE -4/-2 €/MWh RANGE. MISSING MONEY ISSUES LIKELY TO ARISE IN THE SECOND HALF OF THE 2020s AND TO BE AMPLIFIED IN ALTERNATIVE SCENARIOS **



24-25	The CSS level is strictly connected to the evoluon of the market share of exisn CCGTs. During 2024 sll higher than historical level fuel prices guaranty a weak coal-to-gas switching condions, reducing gas market shares also affected by recover in hydro generaon. Furthermore, contracon in electricity demand exacerbate this trend.
26-30	The market compeon is expected to increase with the stable import flows from the northern borders, the rise in renewable capacity, and the entry of approximately 1.8 GW high-efficiency CCGTs, which were acquired through the 2024 Capacity Market aucons. These factors will keep the baseload CSS in negave territory. In the Low scenario, where renewable development is greater, and in the High scenario, where demand is lower, and the compeon within the thermoelectric sector is stronger, this effect will be even more pronounced.
31-50	A□er 2030, a significant decrease in net import flows and the exit of some ageing capacity allow exisng CCGTs (53%-efficiency) to remain the marginal technology in the system for at least 85% of the hours, with the baseload CSS aaining around -1 €/MWh. Greater renewable penetraon in the Low scenario, maintain the baseload CSS below 4 €/Mwh also in the long-term. In the High scenario reduce renewable development favor CCGT producon increasing the baseload CSS.
Main updates	Increase in CSS in the short term are driven by reviewed coal generaon in the three scenarios.

7.4.2 Day-Ahead Market Profitability for CCGT Units

** IN THE SHORT-TERM, EXISTING UNITS ARE EXPECTED TO SUFFER FROM WEAKER SWITCHING CONDITIONS, BUT THE GROWING PENETRATION OF SOLAR IS EXPECTED TO BOOST EVENING PRICE SPIKES IN THE MID- AND LONG-TERM. HIGH-EFFICIENCY UNITS TO MAXIMIZE DAM VOLUMES WHILE PRESERVING A DOUBLE DIGIT CAPTURED MARGINALITY **

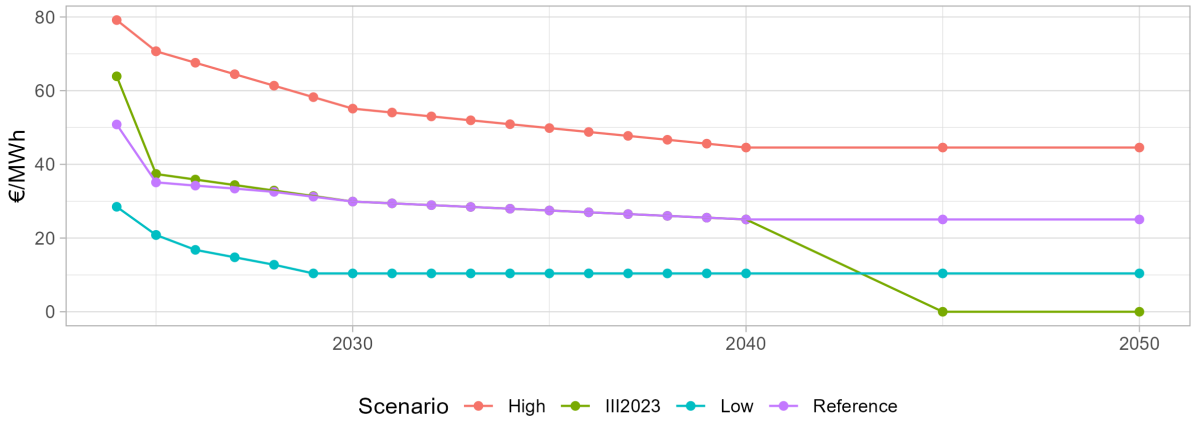


24-25	Captured CSS evolve depending on the zone mix, with southern bidding zones suffering the high operavity of coal-fired units and significant risk of operaon at loss, while CCGT producing in the northern zone manage to guarantee posive margins at around 20 €/MWh , favoured by the current market dynamics.
26-30	As renewable capacity increases, exisng units tend to concentrate their operaons during evening hours to maximize captured margins. The high-efficiency gas-fired capacity captured CSS is subject to compeve market condions as new projects enter the market with support from the latest CM aucon. Despite this, the high efficiency of these projects enables them to maintain an average captured margin above 15 €/MWh.
31-50	Growing renewable penetraon intensifies overgeneraon phenomena and accentuates evening price spikes, determining an increasing trend for captured marginality for exisng units in the first half of the 2030s but load factors reduce progressively on increasing renewables share and increase compeon from high efficiency units.
Main updates	Expected load factor and marginality of CCGT units depend on updated hypothesis concerning commodity prices, market dynamics and new thermoelectric installed capacity.

7.5 Captured Prices of Renewable Sources

7.5.1 Solar Captured Prices

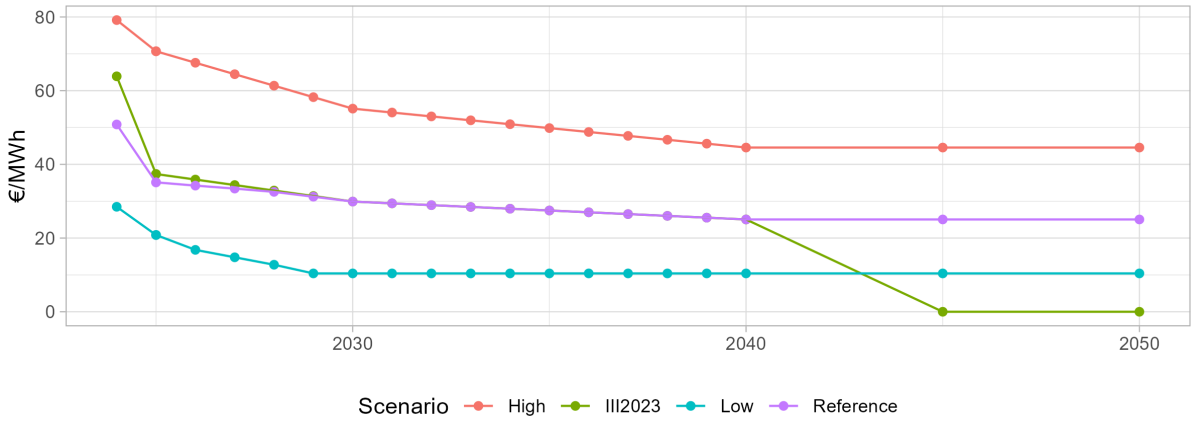
** PROGRESSIVELY INCREASING CANNIBALIZATION EFFECT IS EVIDENT ON SOLAR PRICES FROM THE LATE 2020s, ESPECIALLY IN SOUTHERN MARKET ZONES, WHERE RENEWABLE PENETRATION IS GREATER AND INTERCONNECTION CAPACITY WITH NORTHERN ZONES IS LIMITED **



24-25	Solar power plants benefit of record-high power prices, supported by extraordinary fuels prices.
26-30	Increasing pace of installaons and the consequent cannibalizaon and overgeneraon effects – only parally limited by power intensive storages and grid developments – have an impact on zonal captured prices, which trend diverges compared to baseload prices.
31-50	The increasing occurrence of overgeneraon serves as a market signal for the entry of energy-intensive storages, which parally migate the cannibalizaon phenomenon. A□er 2030, the cannibalizaon effect becomes more noceable in the captured prices of solar energy, parcularly in southern market zones with higher renewable penetraon.
Main updates	Short- results supported by the trend of commodies prices and their effect on power prices. Mid and long- term results are affected by the high degree of cannibalizaon effect.

7.5.2 Wind Captured Prices

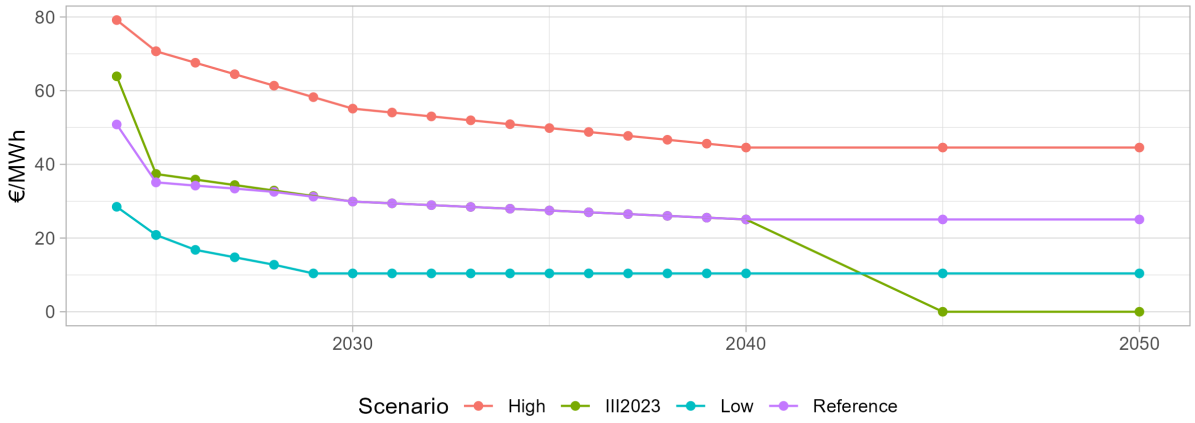
** WIND GENERATION IS LESS CONCENTRATED THAN SOLAR PRODUCTION AND ITS GREATER DISTRIBUTION OVER THE SEASONS AND THE HOURS OF THE DAY LEADS CAPTURED PRICES TO ALIGN WITH – OR EVEN OUTPERFORM – BASELOAD PRICES. **



24-25	Captured prices are basically aligned to zonal baseload prices and benefit from high power prices.
26-50	Captured prices remain basically in line zonal baseload prices also in the long-term. The overgeneraon induced by the growing solar producon has a major impact in the early 2030s, but the results of both sources remain more connected to zonal market dynamics than to the evoluon of the price shape. Also, both sources benefit from a producon profile which is more distributed over the hours of the day and over the year.
Main updates	Short- results supported by the trend of commodies prices and their effect on power prices. Mid and long- term results are affected by the high degree of cannibalizaon effect.

7.5.3 Hydro Run-of-River Captured Prices

** HYDROPOWER GENERATION IS MORE SENSITIVE TO SEASONAL WATER INFLOWS TRENDS THAN TO HOURLY VARIABILITY, SO THAT CAPTURED PRICES REMAIN BASICALLY IN LINE WITH BASELOAD PRICES **

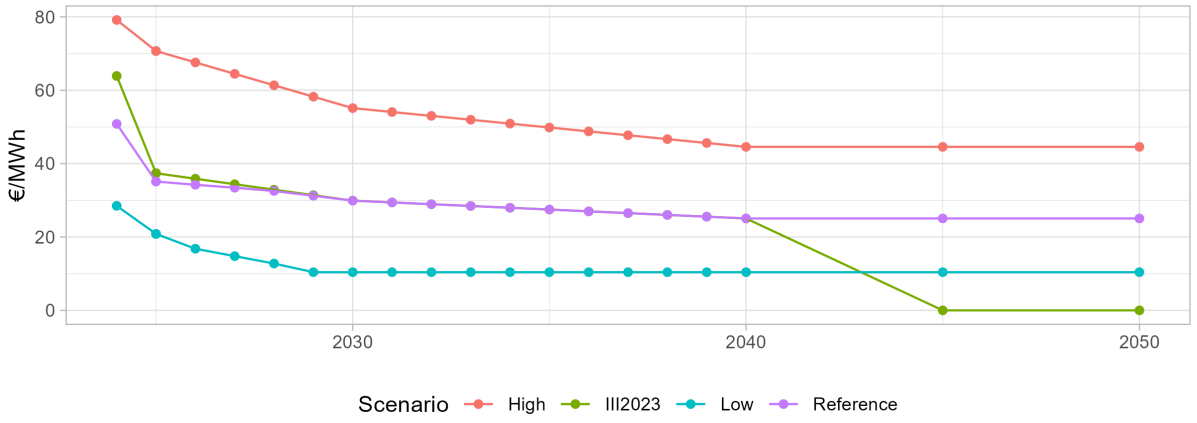


24-25	Captured prices are basically aligned to zonal baseload prices and benefit from high power prices.
26-50	Captured prices remain basically in line zonal baseload prices also in the long-term. The overgeneraon induced by the growing solar producon has a major impact in the early 2030s, but the results of both sources remain more connected to zonal market dynamics than to the evoluon of the price shape. Also, both sources benefit from a producon profile which is more distributed over the hours of the day and over the year.
Main updates	Short- results supported by the trend of commodies prices and their effect on power prices. Mid and long- term results are affected by the high degree of cannibalization effect.

8 Ancilliary Services & Fuels Mix

8.1 Ancilliary Services Volumes, Reference Scenario

** ANCILLARY SERVICES NEEDS ARE EXPECTED TO SHRINK IN THE FUTURE FOLLOWING THE MOST RECENT PAST, AS A CONSEQUENCE OF PECULIAR MARKET CONDITIONS AND CHANGES IN THE SYSTEM MANAGEMENT APPROACH ADOPTED BY THE TSO. IN THE LONG-TERM BESS AND GRID DEVELOPMENT CAN MAKE THE ANCILLARY SERVICES MARKET MORE EFFICIENT **

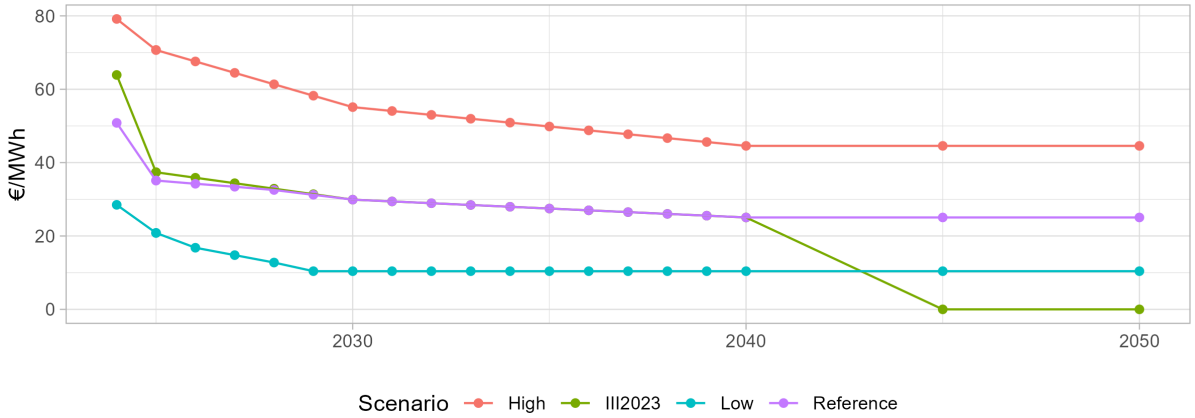


24-25	Procured ex-ante ancillary services volumes are expected to parally recover from 2022, but remaining lower compared to the past as a consequence of (i) greater availability of thermoelectric running reserve due to reversed switching condions, (ii) changes in the network management approach adopted by Terna since the beginning of the cost-containment incenve scheme (2022), (iii) feasibility intervals imposed to power plants in the new Intra-Day Market structure.
26-31	The exit of coal-fired units on the mainland and the progressive increase in the energy mix of renewable producon are compensated by the entry of (i) new thermoelectric and energy intensive storage capacity sustained by the Capacity Market mechanism, and (ii) the diffusion of power intensive BESS that are going to reduce the need of ex ante scheduling, given the availability of flexible resources in the system.
31-50	ASM ex-ante volumes are expected to contract and then remain stable during the 2030s as consequence of a more efficient purchase, thanks to flexible resources and grid reinforcement. On the other side an increase of MB can be expected in line with the increasing volality driven by the strong development of RES in the scenario, sustaining units operavity.
Main updates	ASM volumes incorporate the most recent trends – which are reckoned to be structural in the market – over the enre me horizon simulated. Upward and downward volumes resulng from our model are very symmetric due to the determinisc approach adopted in the simulaons. The

conngent poron of balancing market linked to real me imbalances are not included in the stimate.

8.2 Ancilliary Services Volumes, Alternative Scenario

** ANCILLARY SERVICES EX-ANTE VOLUMES EVOLVE ACCORDING TO THE COMPOSITION OF THE GENERATION MIX AND DAM DYNAMICS IN THE DIFFERENT SCENARIOS. IN THE POST-2030 SCENARIO, STORAGE SYSTEMS AND GRID REINFORCEMENTS ARE EXPECTED TO LIMIT THE EXPANSION TREND IN THE THREE SCENARIOS **



24-25

Procured ex-ante ancillary services volumes are expected to remain low compared to the recent past also in the alternave scenarios, with some differences determined by the different degree of compeon in the thermoelectric sector on the DAM – that translates into different levels of running reserve.

26-31

Rapid growth of non-programmable renewable generaon in the Low scenario is counterbalanced by grid developments and a faster development of energy intensive storages. In the High scenario the development of less flexible resources increases the need to purchase more volumes on MSD.

31-50

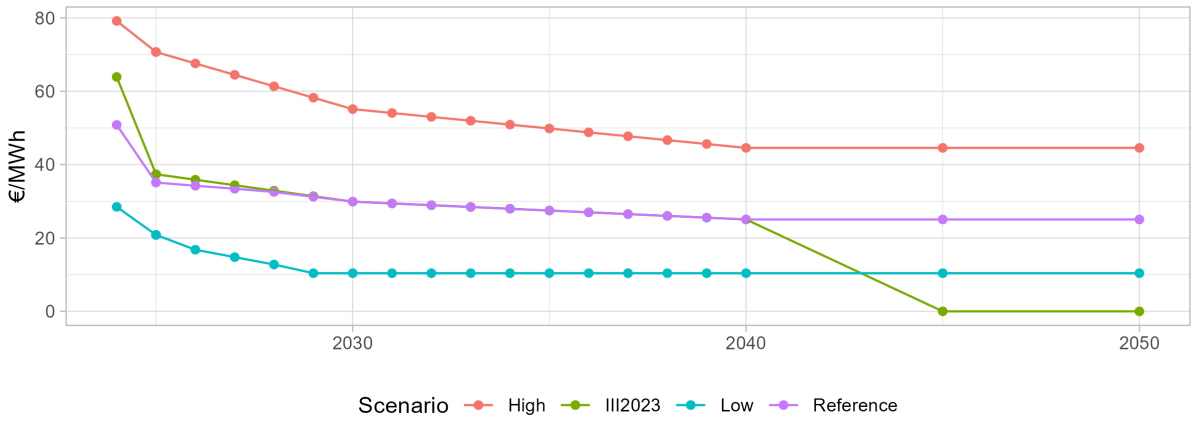
In the Low scenario, further grid development and a major development of energy intensive storage assets help containing ASM volumes. In the High scenario instead ASM volumes remains stable, because of an increased presence of CCGT on the DAM and the of sll acve coal plants unll 2025, furthermore development of energy intensive storage allows to beer regulate the system.

Main updates

ASM volumes incorporate the most recent trends – which are reckoned to be structural in the market – over the enre me horizon simulated. Upward and downward volumes resulng from our model are very symmetric due to the determinisc approach adopted in the simulaons. The conngent poron of balancing market linked to real me imbalances are not included in the smate.

8.3 Ancilliary Services Market prices

** GRID BOTTLENECKS RESOLUTION AND BESS PENETRATION ARE AMONG THE MAIN DRIVERS OF THE FUTURE ASM COMPETITIVE DYNAMICS. THE CAPACITY MARKET STRIKE PRICE (IN DELIVERY YEARS) COULD BECOME THE REFERENCE UPWARD PRICE, WITH MAJOR IMPACTS IN THE CENTRE-SOUTH MARKET ZONE **



24-25

During the first years of delivery of the Capacity Market, the strike price is expected to have a cap effect on prices for start-up and upward regulaon, especially in the Centre-South market zone. However, the recent downward trend of ASM volumes could foster price compeon all over Italy compared to past years.

26-50

Price compeon on the ASM is expected to grow progressively as innovave technological soluons will be gradually available in the system at an increasingly compeve price (e.g., electrochemical storages). Under the hypothesis of an extension of the capacity remuneraon mechanism, the strike price, together with the LCOS of baeries, could become the main factors influencing ancillary services prices in the future.

Main updates

Price projecons are based on a stascal approach describing the historical bidding strategies of market players on the ASM. Historical distribuons of price spreads between DAM and ASM prices for each type of service are assumed constant in the future. Compared to the previous release, the new ASM price projecons incorporate the effects of updated hypothesis determining DAM dynamics and prices.

9 Our Suite of Market Models

ELFO ++ suite has been included among the benchmark models for energy systems' planning in the World Bank database and it is included in the top list of electricity market simulaon models prepared in 2017 by the Joint Research Center of European Commission. ELFO ++suite and its database are used for research acvies in numerous universies with which REF-E has a consolidated collaboraon (Florence School of Regulaon, University of Milan-Bicocca, Bocconi University, Milan Catholic, Milan Polytechnic, Turin Polytechnic, University of Pavia, University of Padua, University of Verona, others).

10 Acronyms